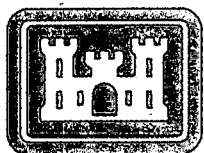


*Due 10 days from  
Aug 28*



**US Army Corps  
of Engineers  
Baltimore District**

**Delivery Order No. 0006  
Total Environmental  
Restoration Contract  
DACA31-95-D-0083**

---

**FORT TOTTEN AND BELLMORE  
U.S. ARMY RESERVE MAINTENANCE FACILITY  
SITE INVESTIGATION AND REMEDIATION**

**Work Plan**

**DRAFT DOCUMENT**

**August 1996**

369853



# REPORT DOCUMENTATION PAGE

Form Approved  
OMB No. 0704-0188

Public reporting burden for this collection of information is estimated to average 1 hour per response, including the time for reviewing instructions, searching existing data sources, gathering and maintaining the data needed, and completing and reviewing the collection of information. Send comments regarding this burden estimate or any other aspect of this collection of information, including suggestions for reducing this burden, to Washington Headquarters Services, Directorate for Information Operations and Reports, 1215 Jefferson Davis Highway, Suite 1204, Arlington, VA 22202-4302, and to the Office of Management and Budget, Paperwork Reduction Project (0704-0188), Washington, DC 20503.

1. AGENCY USE ONLY (Leave blank)		2. REPORT DATE August 1996	3. REPORT TYPE AND DATES COVERED Workplan July 1996 - August 1996	
4. TITLE AND SUBTITLE Workplan for Fort Totten and Bellmore, U.S. Army Reserve Maintenance Facility Site Investigation and Remediation			5. FUNDING NUMBERS U.S. Department of the Army Contract No. DACA31-95-D-0083 Delivery Order No. 0006	
6. AUTHOR(S) M. Kipp, K. Koepenick, Y. Fernandez				
7. PERFORMING ORGANIZATION NAME(S) AND ADDRESS(ES) ICF Kaiser Engineers (ICF KE) 1301 Continental Drive, Suite 101 Abingdon, MD 21009			8. PERFORMING ORGANIZATION REPORT NUMBER	
9. SPONSORING/MONITORING AGENCY NAME(S) AND ADDRESS(ES) U.S. Army Corps of Engineers Baltimore District, 7th Floor P.O. Box 1715 Baltimore, Maryland 21201			10. SPONSORING/MONITORING AGENCY REPORT NUMBER	
11. SUPPLEMENTARY NOTES				
12a. DISTRIBUTION/AVAILABILITY STATEMENT See DoDD 5230.24 "Distribution Statements on Technical Documents."			12b. DISTRIBUTION CODE	
13. ABSTRACT (Maximum 200 words) The U.S. Army Corps of Engineers (USACE) has tasked ICF Kaiser Engineers (ICF KE) to perform remediation and investigative tasks for sites previously identified at Fort Totten and Bellmore U.S. Army Reserve (Bellmore). Fort Totten is located in northeast Queens County, Long Island, New York and Bellmore is located in North Bellmore, Long Island, New York. The purpose of this work is to support the eventual excessing and transfer of property in accordance with 1995 Base Realignment and Closure Program (BRAC). Work for this assignment will be performed under Contract No. DACA31-95-D-0083, Delivery Order 0006.				
14. SUBJECT TERMS Workplan, Site Investigation			15. NUMBER OF PAGES	
			16. PRICE CODE	
19. SECURITY CLASSIFICATION OF REPORT UNCLASSIFIED	18. SECURITY CLASSIFICATION OF THIS PAGE UNCLASSIFIED	19. SECURITY CLASSIFICATION OF ABSTRACT UNCLASSIFIED	20. LIMITATION OF ABSTRACT None	

**WORKPLAN FOR FORT TOTTEN AND BELLMORE  
U.S. ARMY RESERVE MAINTENANCE FACILITY  
SITE INVESTIGATION AND REMEDIATION**

**DRAFT DOCUMENT**

---

**Mike Kipp  
Project Manager  
Delivery Order No. 6**

**ICF KAISER ENGINEERS  
1301 CONTINENTAL DRIVE, SUITE 101  
ABINGDON, MD 21009**

**AUGUST 1996**

## TABLE OF CONTENTS

Section	Page
1.0 INTRODUCTION .....	1-1
1.1 PROJECT ORGANIZATION AND RESPONSIBILITIES .....	1-1
2.0 TECHNICAL APPROACH TO FIELD OPERATIONS .....	2-1
2.1 SOIL SAMPLING .....	2-1
2.1.1 Soil Sample Acquisition Procedures .....	2-2
2.1.1.1 Surface and Shallow Subsurface Soil Sampling Procedures .....	2-2
2.1.1.2 Soil Boring Procedures .....	2-2
2.1.1.3 Excavations .....	2-2
2.1.2 Soil Sample Handling and Collection Procedures .....	2-3
2.1.3 Soil Sample Logging and Lithologic Description .....	2-3
2.2 GROUNDWATER INVESTIGATION PROCEDURES .....	2-4
2.2.1 Geoprobe and Monitoring Well Drilling .....	2-4
2.2.2 Monitoring Well Construction and Installation .....	2-5
2.2.3 Monitoring Well Development .....	2-6
2.2.4 Groundwater Sampling .....	2-7
2.2.4.1 Sampling From Monitoring Wells .....	2-7
2.2.4.2 Geoprobe Screening Level Sampling .....	2-8
2.2.4.3 Samples from Oil/Water Separators .....	2-9
2.2.4.4 Surveying of Well Locations and Elevation .....	2-9
2.2.5 Water Level Measurements .....	2-9
2.3 SEDIMENT SAMPLING .....	2-9
2.4 LEAD PAINT SURVEY .....	2-10
2.5 LEAD PAINT ABATEMENT .....	2-10
2.6 REMOVALS .....	2-11
2.6.1 Removal of Oil/Water Separators, Dry Wells and Washrack .....	2-11
2.6.2 UST Removal .....	2-11
2.6.2.1 Site Preparation .....	2-11
2.6.2.2 Flammability and Combustibility Considerations .....	2-12
2.6.2.3 Testing .....	2-12
2.6.2.4 Tank Sampling .....	2-12
2.6.2.5 Removal of Tank Piping .....	2-13
2.6.2.6 Methods for Purging and Inerting .....	2-13
2.6.2.7 Tank Removal .....	2-14
2.6.2.8 Tank Cleaning .....	2-15
2.6.2.9 Backfilling and Final Restoration .....	2-15
2.6.2.10 Summary of Residuals/Wastestreams .....	2-15
2.7 UNEXPLODED ORDNANCE SURVEY .....	2-16
2.8 SAMPLE PREPARATION AND SHIPPING .....	2-18
2.9 DECONTAMINATION PROCEDURES .....	2-18
3.0 FIELD SAMPLING PROGRAM AND REMEDIATION AT FORT TOTTEN .....	3-1
3.1 OLD GARAGE AREA SUBSURFACE SOIL INVESTIGATION .....	3-1
3.2 REMEDIAL INVESTIGATION NEAR BUILDING 107 .....	3-1
3.3 LITTLE BAY SHORELINE SITE INVESTIGATION .....	3-2
3.4 REMEDIAL INVESTIGATION OF HYDROCARBON CONTAMINATION NEAR BUILDING 602 .....	3-2
3.5 OLD FORT SITE INVESTIGATION .....	3-2
3.6 PARADE GROUNDS SITE INVESTIGATION .....	3-3
3.7 BUILDING 337 SITE INVESTIGATION .....	3-3
3.8 BRAC PARCEL 59 SITE INVESTIGATION .....	3-3

3.9	GROUNDWATER MONITORING AT FORT TOTTEN .....	3-3
4.0	FIELD SAMPLING PROGRAM AND REMEDIATION AT BELLMORE U.S. ARMY RESERVE MAINTENANCE FACILITY .....	4-1
4.1	REMOVAL OF OIL/WATER SEPARATORS, DRY WELLS AND WASHRACK .....	4-1
4.2	UST INVESTIGATION .....	4-2
4.3	BUILDING 700 LEAD ABATEMENT .....	4-4
4.4	LEAD-BASED PAINT SURVEY .....	4-4
4.5	SOIL SAMPLING OF DRAINAGE DITCH .....	4-4
4.6	SOIL SAMPLING OF FORMER LEACHFIELD .....	4-5
4.7	GROUNDWATER MONITORING .....	4-5
5.0	CONTRACTOR QUALITY CONTROL .....	5-1
5.1	CQC ORGANIZATION .....	5-1
	5.1.1 Project Manager .....	5-1
	5.1.2 Contractor Quality Control System Manager .....	5-1
5.2	PERSONNEL QUALIFICATION AND TRAINING .....	5-2
	5.2.1 QC Staff .....	5-2
	5.2.2 Project Personnel .....	5-2
	5.2.3 Subcontractor Qualifications .....	5-2
	5.2.4 Health and Safety Training .....	5-3
	5.2.5 Documentation .....	5-3
5.3	SUBMITTAL MANAGEMENT .....	5-3
	5.3.1 General Requirements For Submittals .....	5-3
	5.3.2 Submittal Scheduling .....	5-4
	5.3.3 Review and Approval of Submittals .....	5-4
	5.3.4 Transmittal of Submittals to Client .....	5-5
	5.3.5 Documentation of Submittals .....	5-5
5.4	INSPECTION PHASES .....	5-5
	5.4.1 Implementation of the 3-Phase Inspection Process .....	5-5
	5.4.2 Inspection Procedures .....	5-6
	5.4.3 Documentation .....	5-7
5.5	DEFICIENCY MANAGEMENT/CORRECTIVE ACTION .....	5-7
	5.5.1 Continual Improvement .....	5-7
	5.5.2 Deficiency Identification and Resolution .....	5-8
	5.5.3 Deficiency and Corrective Action Tracking .....	5-8
	5.5.4 Documentation .....	5-9
5.6	REPORTS .....	5-9
6.0	CHEMICAL DATA QUALITY MANAGEMENT .....	6-1
6.1	DATA QUALITY OBJECTIVES .....	6-1
6.2	SAMPLE HANDLING AND CUSTODY .....	6-1
6.3	QUALITY CONTROL SAMPLES COLLECTED IN THE FIELD .....	6-2
6.4	FIELD DOCUMENTATION .....	6-3
	6.4.1 QC Record Control Procedures .....	6-3
	6.4.2 Sample Identification .....	6-3
	6.4.3 Field Records .....	6-4
6.5	FIELD QC .....	6-5
6.6	CALIBRATION AND MAINTENANCE .....	6-6
6.7	ANALYTICAL PROCEDURES .....	6-6
6.8	LABORATORY QC .....	6-6
	6.8.1 Method/Sample QC .....	6-7
6.9	DATA QUALITY INDICATORS .....	6-7
	6.9.1 Precision .....	6-7
	6.9.2 Accuracy .....	6-8

6.9.3	Sensitivity .....	6-8
6.9.4	Completeness .....	6-8
6.9.5	Representativeness .....	6-8
6.9.6	Comparability .....	6-8
6.10	DATA REDUCTION, ASSESSMENT, MANAGEMENT AND REPORTING .....	6-9
6.10.1	Data Reduction .....	6-9
6.10.2	Data Quality Assessment .....	6-9
6.10.3	Data Management .....	6-10
6.10.4	Data Reporting .....	6-10
6.11	INTERNAL PERFORMANCE AND SYSTEM AUDITS .....	6-10
7.0	SCHEDULE .....	7-1
8.0	REFERENCES .....	8-1

## **LIST OF EXHIBITS**

- Exhibit 1-1      Organization Chart for Fort Dix BRAC 1995 Project
- Exhibit 1-2      Key Individuals for Delivery Order No. 6, New York Sites
- Exhibit 2-1      Typical Monitoring Well Construction
- Exhibit 2-2      Typical Flush Mount Monitoring Well Construction
- Exhibit 2-3      Geoprobe Screening Point Groundwater Sampler
- Exhibit 3-1      Vicinity Map of Fort Totten
- Exhibit 3-2      Soil/Sediment Sampling Program at Fort Totten
- Exhibit 3-3      Groundwater Sampling Program at Fort Totten
- Exhibit 3-4      Locations of Previous Soil Borings in the Vicinity of Building 204
- Exhibit 3-5      Proposed Locations of Soil Sampling Locations in the Vicinity of Building 107
- Exhibit 3-6      Proposed Locations of Sediment Samples Along the Little Bay Shoreline
- Exhibit 3-7      Remedial Investigation of Hydrocarbon Contamination in the Vicinity of Building 602
- Exhibit 3-8      Proposed Sampling Locations in the Old Fort Area
- Exhibit 3-9      Proposed Sampling Locations at the Parade Ground and Building 337
- Exhibit 3-10      Proposed Sampling Locations at BRAC Parcel 59
- Exhibit 3-11      Proposed Monitoring Well Location at Fort Totten
- Exhibit 4-1      Vicinity Map of Bellmore
- Exhibit 4-2      Site Plan
- Exhibit 4-3      Soil/Paint and Waste Characterization Sampling Program, Bellmore Army Reserve Maintenance Facility
- Exhibit 4-4      Groundwater Sampling Program at Bellmore Army Reserve Maintenance Facility
- Exhibit 4-5      Proposed Sampling Locations
- Exhibit 6-1      Summary of Chemical Analytical Methods
- Exhibit 7-1      Delivery Order Schedule

## **LIST OF APPENDICES**

**Appendix A    ICF Kaiser Inspection Schedule and Tracking Form**

**Daily Quality Control Report**

**Type II Corrective Action Request**

**Type I Corrective Action Request**

**Chain-of-Custody Form**

**Appendix B    Fort Totten Map**

## LIST OF ACRONYMS

BRAC—Base Realignment and Closure Program  
CAR—Corrective Action Request  
CGI—Combustible Gas Indicator  
CO<sub>2</sub>—Carbon Dioxide  
CRL—Certified Reporting Limit  
CQC—Contractor Quality Control System Manager  
CQMP—Chemical Data Quality Management Plan  
DQOs—Data Quality Objectives  
EOD—explosive ordnance disposal  
H&S—Health and safety  
HASP—Health and Safety Plan  
HPLC—High Performance Liquid Chromatography  
HSA—hollow-stem auger  
HTRW—Hazardous, Toxic, Radioactive Waste  
ICF KE—ICF Kaiser Engineers  
ID—identification  
ID—inner diameter  
LEL—Lower Explosive Limit  
LQMP—Laboratory Quality Management Plan  
M&TE—measurement and test equipment  
N<sub>2</sub>—Nitrogen  
NFPA—National Fire Protective Association  
NYDEC—New York State Department of Environmental Conservation  
OSHA—Occupational Safety and Health Association  
PE—Performance Evaluation  
PID—photoionization detector  
PPE—Personal Protective Equipment  
PVC—polyvinyl chloride  
QA—Quality Assurance  
QC—Quality Control  
RPD—Relative Percent Difference  
SOP—standard operating procedure  
STP—sewage treatment plant  
SVOCs—Semivolatile Organic Compounds  
TAL—target analyte list  
TCLP—Toxicity Characteristic Leaching Procedure  
TCL—target compound list  
TERC—Total Environmental Restoration Contract  
TPH—total petroleum hydrocarbons  
USACE—U.S. Army Corps of Engineers  
USCS—Unified Soil Classification System  
USEPA—U.S. Environmental Protection Agency  
UST—Underground Storage Tank  
UTM—Universal Transverse Mercator  
VOCs—Volatile Organic Compounds

## 1.0 INTRODUCTION

The U.S. Army Corps of Engineers (USACE) has tasked ICF Kaiser Engineers (ICF KE) to perform remediation and investigative tasks for sites previously identified at Fort Totten and Bellmore U.S. Army Reserve (Bellmore). Fort Totten is located in northeast Queens County, Long Island, New York and Bellmore is located in North Bellmore, Long Island, New York. The purpose of this work is to support the eventual excessing and transfer of property in accordance with 1995 Base Realignment and Closure Program (BRAC). Work for this assignment will be performed under Contract No. DACA31-95-D-0083, Delivery Order 0006.

This Workplan presents the proposed technical approach for conducting specified field activities at Totten and Bellmore and provides a generalized discussion of the programs which will support the investigation (e.g. Quality Assurance (QA), Quality Control (QC) and Laboratory/ Data Management). This Workplan provides descriptions of the sampling procedures or protocols that will be used for conducting field operations, and details the sample collection techniques, and removal action protocols to be used during the performance of field activities. The Workplan is based on:

- a. Objectives presented in the Scope of Work, Delivery Order Number 0006;
- b. Evaluation of previously submitted Reports on Fort Totten and Bellmore
- c. Discussions with the USACE and Fort Hamilton Environmental Office;
- d. Results of site visits that took place in February, 1996.

The proposed work will be conducted in accordance with USACE, U.S. Environmental Protection Agency (USEPA), and the New York State Department of Environmental Conservation (NYDEC) requirements and fully complies with the Health and Safety Plan (HASP) included with this submittal.

## 1.1 PROJECT ORGANIZATION AND RESPONSIBILITIES

Exhibit 1-1 denotes the line of authority and project organization for the proposed work at Fort Totten and Bellmore. Exhibit 1-2 provides the names, titles, addresses and phone numbers of personnel responsible for ensuring the execution of the project.

## **2.0 TECHNICAL APPROACH TO FIELD OPERATIONS**

The purpose of this work is to characterize areas of environmental concern at Fort Totten and at the Bellmore U.S. Army Reserve Maintenance Facility (Bellmore) New York, and remediate selected areas at Bellmore.

The methodology, procedures, measurements, and observations required for each type of field activity are documented in the following sections. These activities include:

- Soil Sampling;
- Groundwater Investigation Procedures;
- Sediment Sampling;
- Lead Paint Survey;
- Lead Paint Abatement;
- Removals;
- Unexploded Ordnance Survey;
- Sample Preparation and Shipping; and
- Decontamination Procedures.

Standard procedures have been outlined for all field activities in accordance with the requirements of USACE, USEPA, and NYSDEC.

### **2.1 SOIL SAMPLING**

The characterization of the soils at Fort Totten and Bellmore will be accomplished by careful logging and sampling of surface and subsurface soils. A Site Geologist will be present during all drilling and soil sample collection activities to maintain descriptive logs and collect appropriate samples for chemical analysis. Samples may be screened and/or prioritized in the field by visual inspection for staining or discoloration and/or with a photoionization detector (PID) as appropriate.

Soil sampling activities will proceed as follows:

- a. All boring/well drilling permits and regulations, as required by the NYSDEC will be secured and/or complied with, and clearance of all underground utilities will be arranged with appropriate plant personnel and local utility companies.
- b. Decontamination for geoprobe and auger drilling equipment will be performed using tap water. Sampling equipment decontamination procedures are discussed in Section 2.4.
- c. Sampling and probing/drilling will be performed under direct supervision of the assigned Site Geologist.
- d. All soil sampling points will be located to map accuracy at the time of sample collection and the locations will be marked or staked for future reference.

## **2.1.1 Soil Sample Acquisition Procedures**

Soil samples may be collected from the surface, via geoprobe, from standard hollow-stem auger soil borings, or from excavations. The sample acquisition techniques are discussed here.

**2.1.1.1 Surface and Shallow Subsurface Soil Sampling Procedures.** Surface and shallow subsurface soil samples may be collected a stainless steel trowel or a stainless steel hand auger. Sample handling and collection are discussed in Section 2.1.2.

Surface Soil Sampling: Surface soil samples will be collected using a stainless steel trowel. The surficial vegetative material will be manually removed from the sampling location then the soil sample will be collected. At geoprobe/soil boring locations, the surficial (0-2 foot) sample will be collected by the geoprobe sampler or split-spoon sampler, as discussed in the following section.

Hand-auger Sampling: Shallow (less than 3 feet) subsurface samples will be collected using a decontaminated 2- or 3-inch diameter stainless steel hand auger. The surface vegetation will be manually removed from the sampling location, then the hand auger will be advanced to the sampling depth, being careful to keep the auger opening clean. A decontaminated auger head will be used to collect the sample. The soil sample will then be recovered from the auger head using a stainless steel scoopula or spoon. Upon completion, the hole will be backfilled with the cuttings.

**2.1.1.2 Soil Boring Procedures.** The geoprobe "push-rod" technique and split-spoon sampling, using a hollow-stem auger rig, will be used to complete soil borings. All boring operations will be conducted in accordance with USACE geotechnical requirements (USACE, 1994). Prior to drilling, the water table elevation will be measured in the closest well to the drilling/probing location to establish the depth of the water-table soil sample. Sampling intervals may be adjusted to accommodate site-specific conditions.

Geoprobe Soil Sampling. Soil samples will be collected using a truck-mounted "geoprobe-type" push-rod rig equipped with 1.5-in diameter push-rods, points, and 2-ft long geoprobe stainless steel macro soil samplers. Using a hydraulic hammer or hydraulic press, the geoprobe rod will be pushed into the ground to the proposed sampling depth. The rod will be withdrawn and a decontaminated stainless steel geoprobe sampler will be attached to the rod. The sampler will be driven through the desired sampling interval and retrieved. Once the completion depth has been reached, the hole will be plugged at the surface with bentonite. The geoprobe technique does not generate cuttings.

Hollow-stem Auger/Split Spoon Sampling. At locations or depths where the geoprobe technique is not successful, standard hollow-stem auger boring techniques will be used. Split-spoon samples will be collected at the surface and at five foot intervals per ASTM D1586-84 as the augers are advanced. Soil samples for chemical analysis and lithologic description will be collected using a decontaminated stainless steel split-spoon sampler. The boring will either be completed as a monitoring well or grouted to the surface. Drill cuttings, if any, will be visually inspected and screened with a PID. For borings which are not to be completed as 2" monitoring wells, cuttings will be back filled into the boring. For borings to be completed as monitoring wells, cuttings will be containerized in 55-gallon steel drums as per NYSDEC guidance. These drums will be labeled, dated and temporarily staged at the drill site pending sampling analytical results.

**2.1.1.3 Excavations.** Excavations will be completed by qualified personnel using a backhoe or other mechanical device. Soil samples will be collected from the backhoe bucket using a stainless steel trowel or by using a hand auger and handled according to the procedures specified in Section 2.1.3. No personnel will enter the excavation at any time. The features to be excavated, along with the mode of sampling, are described below:

- Oil/Water Separators and Dry Well Excavations Oil/water separators and dry well excavations will be sampled using a decontaminated stainless steel hand auger according to procedures outlined in Section 2.1.1.1.
- Underground Storage Tank (UST) Removal Excavations Soil samples from UST removal excavations will be collected using a backhoe. Soil samples will be collected from the bucket using a decontaminated stainless steel trowel.

### **2.1.2 Soil Sample Handling and Collection Procedures**

During the sampling phase, the volatile organic samples (if any) will be collected first and will be transferred from the hand auger, bucket, geoprobe sampler, or split spoon in a manner such that air space is minimized in the sample bottle. Soil samples will be packed in the appropriate sample bottles using a clean stainless steel spatula. The remaining material will be placed in a precleaned stainless steel bowl, coned and quartered according to NYSDEC protocol, and placed in the appropriate sample bottles for non-volatile analyses. For composite soil samples analyzed for Volatile Organic Compounds (VOCs) and Semivolatile Organic Compounds (SVOCs), a portion of each sample will be placed in the appropriate bottles as the samples are collected. The remaining sample portions will be homogenized as described above and placed in the appropriate sample bottles for non-volatile analyses. Each sample bottle will contain a sample label, which will include the project number, sample number, analysis to be performed, time, date, and sampler's initials. Disposable latex gloves will be used during all sampling activity and will be changed between each sample location.

Sample labels and the chain of custody will be completed following the collection of each sample. The labels will be placed on the sample bottle and the bottle placed immediately into a cooler. The cooler will be iced and samples kept at a temperature of 4°C. The completed chain of custody will be sealed in a plastic bag inside the sample cooler.

### **2.1.3 Soil Sample Logging and Lithologic Description**

During the advancement of geoprobe points or hollow-stem auger borings, the Site Geologist will fully describe all activities in the field boring/probing logs. As per USACE geotechnical requirements (USACE, 1994), the following data will be recorded in the boring logs at the drill site:

- a. The name of the Site Geologist(s), project name, location, and site identification (ID);
- b. Depths in feet and fractions thereof (tenths of feet);
- c. Soil descriptions, in accordance with the Unified Soil Classification System (USCS) and prepared in the field by the attending Site Geologist, which include the following information:
  - Classification;
  - USCS symbol;
  - Secondary components and estimated percentage;
  - Color (using Munsell Soil Color Chart);
  - Plasticity;
  - Consistency (cohesive soil) or density (noncohesive soil);
  - Moisture content;

- Texture/fabric/bedding; and
  - Depositional environment.
- d. Cutting descriptions, including basic classification, secondary components, and other apparent parameters;
  - e. Visual estimates of secondary soil constituents (If terms such as "trace," "some," or "several" are used, their quantitative meanings will be defined in a general legend);
  - f. Length of sample recovered for each sample interval for driven samples.
  - g. Blow counts, hammer weight, and length of fall for split-spoon samples;
  - h. Estimated depth interval for each sample;
  - i. Depth to water first encountered during drilling and the method of determination (Any distinct water-bearing zones below the first zone also will be noted);
  - j. General description of the drilling equipment used, including the rod size, bit type, pump type, rig manufacturer, model, and drilling personnel;
  - k. Description of drilling materials used (i.e., bentonite), including the brand name and the quantity;
  - l. Drilling sequence;
  - m. Any unusual problems;
  - n. Start and completion dates of all borings, and a chronological time-sequence of all significant events;
  - o. Lithologic boundaries;
  - p. Volatile organic vapors in surface and subsurface soil samples, as measured using a PID; and
  - q. Additional comments as appropriate.

## **2.2 GROUNDWATER INVESTIGATION PROCEDURES**

Groundwater samples will be collected from groundwater monitoring wells and via the geoprobe sampling technique.

### **2.2.1 Geoprobe and Monitoring Well Drilling**

Drilling and geoprobe activities will proceed as follows:

- a. All well drilling permits and regulations, as required by the NYSDEC will be secured and/or complied with, and clearance of all underground utilities will be arranged with appropriate plant personnel and local utility companies.
- b. Decontamination of well materials and sampling equipment will be performed using tap water. Sampling equipment decontamination procedures are discussed in Section 2.4.

- c. Monitoring well drilling and installation will be performed under direct supervision of the assigned Site Geologist.
- d. All wells will be located to map accuracy at the time of sample collection and locations will be marked or staked for future reference.

Monitoring well installation, development, and sampling methods are described in the following sections.

### **2.2.2 Monitoring Well Construction and Installation**

Monitoring wells will be installed in borings drilled using hollow-stem auger techniques in accordance with USACE geotechnical requirements (USACE, 1994). Applicable portions of the NYSDEC Sampling Guidelines and Protocols will also be followed. Wells will be installed and constructed as follows:

- Monitoring wells will be constructed of 2-inch inner diameter (ID), flush-threaded, Schedule 40 polyvinyl chloride (PVC) blank casing, and 2-inch ID, 0.02-inch factory-slotted, flush-threaded, PVC screen. Bottom plugs and well caps will also be constructed of Schedule 40 PVC. Glues or solvents will not be used.
- The well will be installed through the annular space of the auger. The decontaminated well screen and casing will be assembled as it is lowered down the boring. The completed well string will be suspended off the bottom of the boring by a cable attached to the wellhead.
- A filter pack, consisting of 20/20 size silica sand, will be placed in the annular space from the bottom of the well to a level 3-5 feet above the top of the well screen. This sand size has been previously approved for Fort Totten. The filter pack sand size may be adjusted to accommodate geologic conditions encountered at the screened interval.
- A 5-ft thick bentonite seal composed of 3/8-inch pellets will be placed above the filter pack. If the filter pack is completed above the water table, a minimum of 5 gallons of tap water will be added to the pellets for hydration. The seal will be allowed to hydrate for a minimum of 1 hour before grouting. A bentonite slurry will be used only in cases where the top of the sandpack is sufficiently below the water table to prevent pellets from properly settling through the water column. In such cases, the slurry will be mixed to a thick "batter" like consistency and will be placed in the bore hole using a rigid PVC tremie pipe.
- The remaining annular space will be filled with grout using a tremie pipe. Grout will be composed of 20 parts Portland Type II cement and 1 part bentonite by weight, with a maximum of 8 gallons of tap water per 94-lb bag of cement.
- For wells finished above grade, a 5-ft long, 8-inch diameter protective iron casing will be installed over the PVC riser, to extend approximately 2.5 feet above land surface and seated 2.5 feet into the well seal grout. It will be vented to the atmosphere via a padlocked, hinged cap, which will prevent entry of water but will not be airtight.
- Wells finished below grade will have a 1-ft diameter manhole or valve box designed cover with a lockable water tight cap for the PVC casing.
- A 1/4-inch diameter drainage port will be installed, centered 1/8-inch above the level of the internal mortar collar.

- A 6-inch thick, 4-ft square cement pad will be placed around the wellhead. Steel protective posts will be installed at the corners of the pad.

**Exhibit 2-1 and 2-2** are diagrams of typical 2-inch groundwater monitoring well construction. Well designations will be painted on the protective casing. All locks used to secure the monitoring wells will be keyed with the same key. A field notebook will be kept by the site geologist during all well installations. The notebook will contain, at a minimum, the following information: description and map of the drilling site, on-site personnel, all sampling/drilling activities, well construction details, and monitoring/screening results.

Drill cuttings, if any, will be visually inspected for evidence of contamination and screened with a PID and will be containerized in 55-gallon steel drums. These drums will be labeled, dated and temporarily staged at the drill site pending sampling analytical results.

### **2.2.3 Monitoring Well Development**

The following data will be recorded for development, as required in the USACE geotechnical requirements (USACE, 1994):

- Well designation;
- Date of well installation;
- Date of development;
- Static water level before and after development;
- Quantity of water lost during drilling and fluid purging, if water is used;
- Quantity of standing water in well and annulus (30 percent porosity assumed for calculation) prior to development;
- Specific conductivity, temperature, and pH measurements will be taken and recorded at the start of development, after every well volume, and at the conclusion of development. Water quality meters will be calibrated prior to each day's operation in the field;
- Depth from top of well casing to bottom of well;
- Screen length;
- Depth from top of well casing to top of sediment inside well, before and after development;
- Physical character of removed water, including changes during development in clarity, color, particulates, and odor;
- Type and size/capacity of pump and/or bailer used;
- Description of surge technique, if used;
- Height of well casing above or below ground surface; and
- Quantity of water removed and removal time.

Development will be accomplished by pumping the groundwater until the water is clear and the well is sediment free to the fullest extent practical. Monitoring wells will be developed with a submersible

centrifugal pump. If well yields cannot sustain the flow rate of the submersible pump, a decontaminated PVC bailer will be used to purge the well. Water will not be added to the well to aid in development, nor will any type of air-lift technique be used. The pump, hose, bailer and cable will be decontaminated by the procedures outlined in Section 2.9 of this plan.

Well development will begin no sooner than 48 consecutive hours after completion of the well, but not longer than seven days. Development will proceed until the following conditions are met:

- a. The water is clear to the unaided eye;
- b. Water pH, conductivity, temperature, and turbidity have stabilized;
- c. The sediment thickness remaining in the well is less than 1 percent of the screen length;
- d. At least five well volumes (including the saturated filter material in the annulus) plus the volume of water added during the drilling process have been removed from the well; and
- e. The cap and all internal components of the well casing above the water table have been rinsed with well water to remove all traces of soil/sediment.

Development water from monitoring wells will be inspected for visual or olfactory evidence of contamination and screened with a PID and will be containerized on-site pending analytical results. Disposal of containerized development water will follow NYSDEC guidance on investigative derived wastes.

#### **2.2.4 Groundwater Sampling**

Groundwater sampling techniques for monitoring wells and for screening level samples collected directly through the geoprobe system are discussed in the following sections.

**2.2.4.1 Sampling From Monitoring Wells.** Groundwater sampling of monitoring wells will be conducted in the following manner:

- All equipment will be decontaminated using techniques described in Section 2.4 prior to its delivery to a monitoring well site;
- Clean plastic sheeting will be placed on the ground surrounding the well to prevent surface soil contamination of downhole equipment;
- Before purging begins, the water level and total depth of the well will be measured using an electric sounding device as described in Section 2.2.5. This information will be used to determine the bore volume;
- A submersible pump will be used with attached dedicated polyethylene tubing to purge the wells at pumping rates of 1-5 gallons per minute (gpm) (3.8-19 L/min);
- Purging will begin with the pump near the top of the water column to remove stagnant water from the upper portion of the well casing. The pump will be lowered (as needed) down the water column during purging to accommodate draw-down. Purge water from monitoring wells will be inspected for visual or olfactory evidence of contamination and screened with a PID. The purge water will be containerized on-site pending analytical results. Disposal of containerized purge water will follow NYSDEC guidance on investigative derived wastes.

- To ensure that formation water is being sampled, a minimum of 5 bore volumes will be purged from the well. One well volume equals the volume of water in the casing plus the volume of water in the screened well. For a 2-inch well, one volume =  $(0.162) \times (\text{the water column height (ft)}) + (0.17) \times (\text{the saturated sandpack height (ft)})$ . If the discharge is not at stable pH, temperature, specific conductance, and turbidity after 5 purge volumes have been removed, purging will be continued until these characteristics are demonstrated, if feasible. If the well is pumped dry before 5 volumes are removed, the well will be allowed to recover to at least 90% of the initial water level, purged dry a second time, and then sampled.
- Water quality parameters including pH, temperature, and specific conductance will be measured at least once for every volume of purge water removed. These measurements and other relevant information will be recorded on the Monitoring Well Purge Form. Water quality meters will be calibrated prior to each day's operation in the field;
- Following the removal of 5 well volumes and stabilization of water quality parameters, samples will be collected in order of increasing analyte volatility: VOCs, SVOCs, pesticides/PCBs, and inorganics.
- If the well is being sampled for any parameter other than VOCs, the sample will be collected through the submersible pump and dedicated tubing at a decreased flow rate (0.1 to 0.5 gal/min). If the well is being sampled for VOCs, the sample will be collected using a dedicated teflon bailers with dedicated nylon rope. Sample water will be obtained from the midpoint of the screened interval of the well.
- Sample labels and the chain-of-custody forms will be completed after each sample is collected. The labels will be placed on the sample bottle and the bottle placed immediately into a cooler. The cooler will be iced and samples kept at a temperature of 4°C. The completed chain of custody will be placed in a plastic bag and then into the cooler with the sample; and
- After sample collection is completed, water quality parameters will be remeasured and recorded on the Monitoring Well Purge Form.

**2.2.4.2 Geoprobe Screening Level Sampling.** Groundwater samples will be collected for screening purposes using the geoprobe system (see Exhibit 2-3). The geoprobe groundwater sampling system consists of hollow steel geoprobe rods, a dedicated steel drive point, a retractable 1-ft stainless steel screen, and dedicated 3/8-in polyethylene tubing. The drive point is hydraulically driven to the desired sampling depth and disengaged. The rods are then raised one foot, allowing the stainless steel screen to drop into the open interval. Clean, dedicated polyethylene tubing is then inserted down the rods and engaged to the screen section. An inertial check valve connected to the 3/8-in tubing is used for purging and sampling. Groundwater screening samples will be collected in the following manner:

- All equipment will be decontaminated using techniques described in Section 2.4 prior to its delivery to a sampling site;
- Clean plastic sheeting will be placed on the ground adjacent to the wellpoint to prevent surface soil contamination of downhole equipment;
- Purging and sampling will be accomplished by attaching an inertial check valve to dedicated disposable polyethylene tubing.
- For purging, a minimum of 5 bore volumes will be removed from the geoprobe point. One well volume equates to 0.006 times the water column height (ft) plus 0.01 times the saturated sandpack height (ft). Assuming a well diameter of 3/8-in, a bore diameter of

1.5-in, and a screened interval of three feet, five well volumes would be approximately 0.4 gallons. If the discharge is not at stable pH, temperature, specific conductance, and turbidity after 5 purge volumes have been removed, purging will be continued until these characteristics are demonstrated, if feasible. If the geoprobe point becomes dry before 5 volumes are removed, the point will be purged dry a second time and sampling will be conducted as soon as sufficient water is available.

- Water quality parameters including pH, temperature, and specific conductance, will be measured at least once for every volume of purge water removed. These measurements and other relevant information will be recorded.
- Samples will be collected using a peristaltic pump attached to the 3/8-in tubing. Samples will be collected in the following order: VOCs, SVOCs, pesticides/PCBs, and inorganics.
- Sample labels and the chain of custody will be completed following the collection of each sample. The labels will be placed on the bottle and the bottle placed immediately into a cooler. The cooler will be iced and the samples kept at a temperature of approximately 4°C. The completed chain of custody will be placed in a plastic bag and then into the cooler with the sample.

**2.2.4.3 Samples from Oil/Water Separators.** Liquid samples from Oil/Water separators will be collected using a decontaminated, dedicated glass coliwasa tubes or teflon tank samplers. The coliwasa tubes will be lowered into the tank so that a vertical column of the material is sampled, plugged, and removed from the tank. The sample will then be transferred from the coliwasa to the appropriate sample container.

**2.2.4.4 Surveying of Well Locations and Elevation.** Monitoring wells will be surveyed by a New York licensed professional land surveyor, who will use a Universal Transverse Mercator (UTM) State Planar, or latitude and longitude grid accurate to within  $\pm 3$  feet to establish the well's map coordinates. Additionally, elevations for the natural ground surface at each well and the top of the PVC casing will be determined to within  $\pm 0.01$  foot using the National Geodetic Vertical Datum of 1929. The monitoring well elevation survey will be conducted within a 5-week period after the last well has been installed at the site.

### **2.2.5 Water Level Measurements**

Water levels of groundwater monitoring wells will be measured relative to the top of PVC well casing and will be recorded to the nearest hundredth of a foot.

- Water levels and total well depths will be measured using a steel tape, electric sounding device, manometer, or a pressure transducer. The tape will be washed withalconox and raw water, rinsed with raw water and deionized water between consecutive water level measurements. All measurements of the depth to groundwater will be referenced to a permanently marked reference point on the top rim of the monitoring well PVC casing.

## **2.3 SEDIMENT SAMPLING**

Sediment samples will be collected in the following manner:

- Samples will be collected with stainless-steel spoons or trowels if there is little or no water on top of the sediment at the sampling location and the water velocity is low. For sampling locations where the water above the sediment is a few feet deep or the water velocity is high, a stainless-steel corer or other device that eliminates sample washing will be used. This will help ensure the integrity of the surface layer of sediment and minimize the loss of fine-grained material in the sediment.

- Sediment samples collected for volatile analyses will be packed into appropriate sample bottles using a decontaminated stainless steel spatula in such a manner that air space is minimized in the sample bottle. Sediment samples collected for non-volatile analyses will be placed in a stainless steel bowl and coned and quartered with a stainless steel spoon before being placed in sample containers. Rocks, twigs, and other debris will be removed from the sample prior to homogenization if they are not considered part of the sample.
- All sediment sample locations will be marked on a site map. A numbered stake will be placed above the visible high water mark on the bank closest to the sampling location. A description of the sampling site will be entered into the field logbook. This description will be adequate to allow the sampling station to be reoccupied at a future date.

## 2.4 LEAD PAINT SURVEY

All of the buildings at Bellmore contain painted covered surfaces. Samples of paint from the interior and exterior of each building will be obtained to determine lead content. The location of these samples will be field-determined to represent the spectrum of painted surfaces found in the buildings.

Paint samples will be collected on a piece of polyethylene sheeting and transferred into wide-mouth polyethylene laboratory cleaned bottles. The samples will be removed by scraping the selected surface with a stainless steel spatula or by breaking off chips of peeling paint, to obtain a 20-gram sample. If multiple layers of paint are evident, the sample will be composited from all layers; compositing of similarly-painted surfaces at the same building also may occur. The sampling locations will be clearly marked including sample ID on the sampled surface for future reference. Logbooks and a photo-log will be maintained describing exact locations and conditions found at each sampled location, and labeling and shipping will proceed as described for soil samples.

## 2.5 LEAD PAINT ABATEMENT

Lead paint will be removed from Building 700 located at Bellmore. The building measures approximately 20 x 25 x 12 ft. The walls and roof are constructed of sheet metal and the floor consists of several concrete slabs. The interior and exterior roof and walls are covered with paint that is now peeling and flaking off. The loose friable paint will be removed as follows:

- Initially the site will be prepared by laying down polyethylene sheeting to collect any particulates of paint.
- All surfaces will be hand scrapped by technicians wearing level C protection as specified in the HASP.
- <sup>HEPA</sup> Hepa vacuums will be used to collect the paint particles and dust as the material is removed. A water mist will be dispersed over the work area to further minimize the potential for dust outside of the immediate work area.
- Material removed will be placed in DOT approved drums for temporary storage and disposal.
- All scraped surfaces will be encapsulated using a exterior sealant specifically designed to retard release of remaining paint.

Air Monitoring: Direct reading air monitoring will consist of a MIE brand mini aerosol monitor (Mini-Ram). Should the level in the Mini-Ram exceed 0.03 mg/m<sup>3</sup> above background for the shift

average (SA) or, Time Weighted Average (TWA) the operation will cease pending an evaluation of personnel and conditions.

## **2.6 REMOVALS**

The following sections present the general procedures that will be implemented for the removal of oil/water separators, dry wells and USTs.

### **2.6.1 Removal of Oil/Water Separators, Dry Wells and Washrack**

Following sampling and characterization of contained material, the liquid material in the separators will be removed in bulk with a vacuum truck. Following removal of the liquid, any non-pumpable sludge will be dug out with the trackhoe. If necessary, the vaults will be entered in accordance with the HASP procedures to remove any residual material. The material will be scraped from the side walls and floor and shoveled into the bucket of the trackhoe. The separators washrack drain and associated piping will be dismantled and rinsed with water and detergent.

Once the solid material has been removed, the technicians will pressure wash the pit using a 3,000 PSI pressure washer and detergent. A 2-inch diaphragm pump will be used to collect the washwater and rinsate. The water will be pumped into the 55 gallon 17-E drums for storage and shipment for disposal.

The trackhoe with hoe-ram attachment will be used to break the concrete linings of the separators and the dry wells. The concrete will be removed and the excavation will be examined for signs of contamination.

Excavations will be backfilled with clean fill following approval from USACE representatives. The material will be placed in 12 inch lifts and compacted with the trackhoe bucket.

### **2.6.2 UST Removal**

The removal of USTs will be in compliance with all applicable regulations of the State of New York. As part of this Delivery Order, one possible UST will be removed at the Bellmore site. A possible gasoline UST of unknown size, age, and construction may be present immediately south of Building 600 (garage) as indicated by a vent pipe located along the southern wall of the garage and the nearby concrete slab of a former pump island. No records of removal or environmental sampling for this tank were available. Therefore, a magnetic survey will first be conducted in the area immediately south of Building 600 to determine whether a steel UST is present. If present the UST will be removed according to the procedures outlined in the following sections.

**2.6.2.1 Site Preparation.** Site preparation activities will include, arrangement of a utility mark-out to identify public utility underground service lines within or near the work zones, and the delineation of work and support zones and the construction of a temporary soil staging area and tank decontamination area. Caution tape and safety fence will be used to establish the boundaries of the exclusion zone, contamination zone, and the support zone. A site safety meeting will also be conducted which will include the review and acknowledgement of the HASP by all site personnel.

The temporary soil staging area will be comprised of a four-sided, bermed area prepared in a location identified by ICF KE and USACE representatives. The area will be lined over the berms with two layers of 6-mil plastic sheeting. The seams will be overlapped to prohibit cross contamination to the underlying ground. The plastic sheeting will be placed over the berms and keyed into the outside of the berm to prohibit shifting.

The temporary tank decontamination area will be constructed in a similar fashion as the soil staging area. A submersible garden hose pump will be provided to collect decontamination water generated during the tank cleaning activities.

**2.6.2.2 Flammability and Combustibility Considerations .** Flammable or combustible vapors are likely to be present in the work area. The concentration of vapors in the tank, the excavation, or the work area may reach the flammable (explosive) range before venting is completed and a safe atmosphere is reached. Therefore, precautions will be taken to:

- Eliminate all potential sources of ignition from the area (for example, smoking materials, explosion-proof electrical and internal combustion equipment);
- Prevent the discharge of static electricity during venting of flammable vapors; and
- Prevent the accumulation of vapors at ground level.

A combustible gas indicator (CGI) will be used to check for hazardous vapor concentrations. All open flames and spark-producing equipment within the vapor hazard area will be shut down. Electrical equipment (for example, pumps and portable hand tools) used in the area will be explosion-proof in accordance with the NFPA 70B Class I, Division I, Group D or otherwise approved for use in potentially explosive atmospheres.

**2.6.2.3 Testing.** The tank atmosphere and the excavation area will be regularly tested for flammable or combustible vapor concentrations until the tank is removed from both the excavation and the site. Such tests will be made with a CGI which is properly calibrated according the manufacturer's instructions (typically on pentane or hexane in air), and which is thoroughly checked and maintained in accordance with the manufacturer's instructions. Personnel responsible for testing will be completely familiar with the use of the instrument and the interpretation of the instrument's readings.

The tank vapor space will be tested by placing the CGI into the fill opening with the drop tube removed. Readings will be taken at the bottom, middle, and upper portions of the tank, and the instrument will be cleared after each reading. If the tank is equipped with a non-removable fill tube, readings will be taken through another opening. Liquid product entering the probe will be avoided. Readings of 20% or less of the lower explosive limit (LEL) limit will be obtained before the tank is considered safe for removal from the ground.

Personnel are aware that combustible gas indicator readings may be misleading where the tank atmosphere contains less than 5% by volume oxygen, as in a tank vapor-freed with CO<sub>2</sub>, N<sub>2</sub>, or another inert gas. The oxygen meter will be used whenever the CGI is used, prior to and during confined space work, and hot work involving welding, cutting, or other high heat producing operation where flammable or combustible vapors may be present. Both units will also be used to monitor the tanks and surrounding area prior to and during pumping of tank residues, cleaning operations, removal, and crushing.

**2.6.2.4 Tank Sampling.** The removal of overburden materials from the top of the tank may be necessary to gain access to a tank opening. Excavated soil will be screened with a PID, and staged adjacent to the excavation. If there is no evidence of contamination, this material may be used later as backfill. Construction fencing with flashing barricades will be installed around the perimeter of any excavation and secured to restrict access during non-working hours.

Once access to the tank is enabled, the contents of the tank and physical phase separation will be determined using a graduated measuring stick, an oil/water interface probe with water soluble paste indicators, or with hollow "sludge judge" samplers. Volume of material in the tank will be calculated using the known dimensions of the tank, the depth of material, and whether the tank is vertically or horizontally positioned.

If the contents of the tank to be removed/abandoned are unknown or questionable, tank sampling will be collected using stainless steel and/or teflon equipment such as bacon-bomb samplers, dredge samplers, or disposable bailers. Samples will be analyzed for ASTM fingerprint method D3328 or other appropriate method.

If contents of the tank are known (or determined through analysis), liquids and residues remaining in the tank will be removed using explosion-proof or air-driven pumps. During removal of liquids or residues from the tank it is likely that air will enter the tank, and may bring the tank atmosphere into the flammable range. Extra care will be taken during removal operations to monitor the tank atmosphere. Pump motors and suction hoses will be grounded to prevent electrostatic ignition hazards. It may be necessary to use a hand pump to remove the last few inches of liquid from the bottom of the tank. If a vacuum truck is used for removal of liquids or residues, the area of operation for the vacuum will be upwind from the tank and outside the path of probable vapor travel. The vacuum pump exhaust gases will be discharged through a hose of adequate size and length downwind of the truck and tank area.

Material removed from the tank will be transported off-site and properly disposed of by a licensed waste hauler. Certification of the volume and final disposition of material will be obtained and included in the final report.

**2.6.2.5 Removal of Tank Piping.** If not already uncovered during tank sampling, the overburden from tank piping will be removed. Excavation will proceed to the top of the tank. If possible, all remaining connections will be removed by disconnecting joints rather than cutting or burning. If required by the facility, no hot work will be performed without a hot work permit, issued after testing the LEL. The drop tube will be removed, except when it is planned to vapor-free the tank by using an eductor as described in Section 2.6.2.6. The vent line will remain connected until the tank is purged. All other tank openings will be temporarily plugged so that all vapors will exit through the vent line during the vapor-freeing process. Tank piping will be disconnected from its end point (e.g., dispenser, fill port) and drained and flushed back into the tank. Piping will then be excavated, decontaminated and placed in a scrap metal roll-off. The following methods will be employed to decontaminate the piping:

- Construct a decontamination containment pad using plastic sheets and a six inch "berm" using two inch by six inch lumber or equivalent;
- Drain and containerize any residual pipeline section contents;
- Reduce any "long pipeline to ten foot sections, using a manual pipe cutter or equivalent, cold cut technique (the smaller section will facilitate decontamination and disposal);
- Rinse the interior and exterior of the piping using water and industrial detergent and scrubbing the interior with a long-handled cleaning instrument;
- Stage the pipe sections on plastic at the facility to allow for bulk scrap metal disposal; and
- Collect and containerize the decontamination liquids.

**2.6.2.6 Methods for Purging and Inerting.** "Purging" is the removal of flammable vapors from a tank so as to deprive a potential fire of any source of fuel. "Inerting" is the displacement of oxygen from a tank (and the incidental removal of some vapors) to deprive a potential fire from a source of oxygen. A tank may be inerted or purged by one of the methods described below. Before initiating work in the tank area or in the tank, a CGI will be used to assess vapor concentrations in the tank and work area.

Inert Gas Methods In the event that oxygen levels are unacceptable ( $>23.5\%$ ), the tank atmosphere may be displaced with an inert gas such as  $\text{CO}_2$  or  $\text{N}_2$ . The inert gas will be introduced through a single tank opening at a point near the bottom of the tank at the end of the

tank opposite the vent. When inert gases are used, they will be introduced under low pressure to avoid the generation of static electricity. When using CO<sub>2</sub> or N<sub>2</sub>, pressures in the tank will not exceed five pounds per square inch gauge.

Tank removal personnel are aware that the process of introducing compressed gases into the tank may create a potential ignition hazard as the result of the development of static electrical charges. The discharging device will therefore be grounded. As explosions have resulted from the discharging of CO<sub>2</sub> fire extinguishers into tanks containing a flammable vapor-air mixture, CO<sub>2</sub> extinguishers will not be used for inerting flammable atmospheres.

If the method described above is not practical, the tank may be inerted by adding solid carbon dioxide (dry ice) to the tank in the amount of at least 1.5 pounds per 100 gallons of tank capacity. The dry ice will be crushed and distributed evenly over the greatest possible area in the tank to promote rapid evaporation. As the dry ice vaporizes, flammable vapors will flow out of the tank and may surround the area. Therefore, where practical, all tank openings will be plugged except the vent after introducing the solid CO<sub>2</sub> and continue to observe all normal safety precautions regarding flammable or combustible vapors. Tank removal personnel will make sure that all of the dry ice has evaporated before proceeding.

Purging Methods Flammable vapors may be purged from the tank by one of two methods of tank ventilation listed below:

- *Eductor-type Method:* The eductor-type air mover, usually driven by compressed air, draws air out of the tank through the drop tube. The drop tube and vent line should remain in place to ensure ventilation at the bottom of the tank. The air mover will be properly bonded to generation and discharge of static electricity. An eductor extension will be used to discharge vapors a minimum of 12 feet above grade.
- *Ventilation with a diffused air blower:* This technique requires the removal of the drop tube and insertion of a perforated brass pipe to the bottom of the tank. Air is then forced down through the brass pipe and out the vent line. When using this purging method, it is imperative that the air-diffusing pipe is properly bonded to prevent the discharge of a spark. Air supply will be from a compressor that has been checked to ensure a clean air supply and is free from volatile vapors. Air pressure in the tank will be maintained at or below five pounds per square inch gauge.

If the tank atmosphere is still greater than 20% LEL after steps taken prior to removal (e.g., remove pumpable product, test tank interior for flammables, inert and purge as needed for safe atmosphere), then the tank will be foamed. The surface of any liquid remaining in the tank will be "foamed" with a fire fighting or vapor suppression foam. This foam blend will be three inches or four inches thick and will have the effect of suppressing vaporization of the volatile material. The foam will be applied through a tank opening. After laying the foam blanket, the tank may have to be ventilated so that the flammable vapor concentration is reduced to less than 20% of the LEL on the CGI. In extreme cases, high expansion foam can be used to completely fill the tank. No ventilation will be necessary in this case.

**2.6.2.7 Tank Removal.** After the tank has been freed of vapors and before it is removed from the excavation, all accessible holes will be plugged or capped. One plug will have a 1/6 inch vent hole to prevent the tank from being subjected to excessive differential pressure caused by temperature changes. The tank will be positioned with this vent plug on top of the tank during subsequent handling.

Excavation will proceed around the tank to uncover it for removal. Soil will be excavated with a tracked excavator and placed in a lined and bermed staging area. The staged soil will be covered at the end of each day and during inclement weather.

The tank will be carefully removed from the excavation and placed on a level surface within the decontamination area. Wood blocks will be used to prevent movement of the tank after removal and prior to crushing for transportation and disposal. Trained personnel will monitor the tank atmosphere for explosive vapors and oxygen periodically during the excavation process.

Once the tank has been chocked and the atmosphere within the tank checked, the tank will be inspected from the outside for holes and pits and the findings documented.

**2.6.2.8 Tank Cleaning.** Following removal and inspection of the tank, the tank will be cleaned on-site. Pumpable liquids and non-pumpable sludges/solids encountered will be pumped and/or manually placed in 55-gallon DOT-approved drums which will be marked, labeled and staged pending disposal. Spent cleaning supplies (i.e., sorbent pads, plastic, personal protective equipment (PPE), etc.) will be disposed along with the tank contents. Final cleaning will consist of rinsing the tanks with potable water and detergent as warranted for disposal acceptance. Tanks will be wiped or squeegeed dry. Continuous air monitoring will be performed to confirm that proper PPE is being utilized and to maintain public safety.

If significant sludge is present in a tank and there is concern for tank rupture or spillage during removal, the tank may be cleaned in-place using a high pressure water laser and specialized tank cleaning head with up to a 1/2 hour cleaning cycle. Each tank will be accessed through existing manways, if present. If necessary, a manway will be installed utilizing non-sparking tools to facilitate access into the tanks. Any remaining process piping shall be drained back to the tanks and flushed as required.

If in-place cleaning is necessary, purging or inerting of the tank will be performed as indicated in Section 2.6.2.6. A combustible gas meter will be employed to measure oxygen concentrations and the level of flammable vapors as a percent of its LEL before personnel enter each vessel for cleaning. It is expected that Level "B" personal PPE will be required in this situation. Confined space entry procedures will be utilized as specified in the HASP.

After the inspection and cleaning, the tank will be reduced to small sections by mechanical flattening using the tracked excavator and placed in the disposal roll-off container together with any other debris. The scrap metal debris will be disposed at an approved disposal facility, and/or as scrap metal if decontamination is sufficient for facility acceptance.

**2.6.2.9 Backfilling and Final Restoration.** Excavated soils and overburden materials generated from removing the tank that are deemed suitable in accordance with the NYDEC guidelines, will be used to backfill the excavation. Clean fill will be provided to supplement the backfill. Documentation certifying the cleanliness of the fill material will be submitted with the final report.

Fill will be placed in the excavated void(s) in one foot lifts and brought to grade. A backhoe and vibratory compactor will be utilized to spread and compact the soil. Final site restoration will consist of grading at all sites and re-seeding, where required.

**2.6.2.10 Summary of Residuals/Wastestreams.** It is anticipated that the following wastestreams may be generated during tank removal activities:

- Tank and piping rinsate
- Free product in excavation area
- Tank bottoms, sludges, solids
- Contaminated soil
- Scrap metal
- Personal protective equipment
- Concrete, asphalt and fiberglass

Approaches to handling these wastestreams are presented in the sections below.

**Tank and Piping Rinsate** All rinsates generated from the tank and piping will be collected and removed utilizing a vacuum pump. All material will be placed in DOT-approved 55-gallon drums or an on-site tanker truck. Any drums generated will be properly marked and labeled with their contents and staged in a location so as not to interfere with the flow of traffic in the area.

**Free Product in Excavation Area** Free product in the excavation areas will be pumped to DOT-approved 55-gallon drums. Any drums generated will be sampled and analyzed for disposal purposes. The drums will be marked, labeled, and disposed appropriately.

**Tank Bottoms, Sludges, and Solids** All tank bottom contents including sludges and solids will be collected by either manual lifting from the tank or by vacuum pump and placed in DOT-approved 55-gallon drums or an on-site tanker truck. Any drums generated will be properly marked and labeled with their contents and staged in a location so as not to interfere with the flow of traffic in the area.

**Contaminated Soil** Excavated soils will be removed from around the sides of the tank, screened with a PID and segregated based on the readings obtained from the PID. Excavated soil will be placed on plastic sheeting. Contaminated soils will be sampled according to characterize the material for proper disposal.

**Scrap Metal** The piping associated with the USTs will be transported and disposed of at a licensed steel recycler after proper cleaning of the scrap metal on site.

**Personal Protective Equipment** All PPE generated during tank closure will be placed in DOT-approved 55-gallon drums. All drums will be properly marked and labeled with their contents and staged in a location so as not to interfere with the flow of traffic in the area.

**Contaminated Groundwater in Excavation** Contaminated groundwater, if encountered in the excavation, will be removed by either centrifugal pump or vacuum pump and stored in DOT-approved 55-gallon drums or an on-site tanker truck. If the quantity of contaminated water is sufficiently large, a bulk storage tank will be used.

The pumped groundwater will be analyzed for disposal purposes per the disposal facility parameters. The groundwater will also be analyzed to determine if any contaminants are present at the site above the groundwater standards as specified in NYDEC Ambient Water Quality Standards and Guidance Values, Oct 1993,. If the groundwater is contaminated, it will be addressed by a separate groundwater treatment phase for this site.

## **2.7 UNEXPLODED ORDNANCE SURVEY**

The Fort Totten field investigative work in the Old Fort Area includes intrusive geoprobe sampling and surface sediment sampling in areas that potentially contain UXO. These sites will require UXO clearance before work is conducted. Sites requiring UXO clearance are specified in Sections 3.5 of the Workplan.

UXO support will be provided by a qualified explosive ordnance disposal (EOD) subcontractor. Only qualified EOD technicians are authorized to inspect an area or bore hole for explosive hazards and to declare an area or bore hole free of ordnance hazards.

The proposed UXO surveys associated with this investigative work are divided into two components. A UXO surface clearance and safety survey will be conducted to ensure that the surface and near surface areas encountered by the work crews are clear of UXO. A downhole UXO screening for intrusive geoprobe points and potential installation of soil borings and monitoring wells will then be conducted to search for UXO in the subsurface.

**UXO Surface Clearance and Safety Survey.** During this phase, the terrain upon which the work crews and equipment will travel and the specific sampling sites themselves will be cleared. The following are the general procedures that will be followed by EOD personnel at the individual subsurface investigation sites.

- a. A clearance team of EOD specialists will conduct a visual sweep 25 feet wide of the proposed route the geoprobe/drill rig will take from the road to the site. EOD personnel will maintain a line of sight with each other at all times and maintain communication with other field crew members.
- b. If UXO is encountered, EOD technicians will attempt to find a clear route around the hazardous item. If a safe route is not established, the UXO will be flagged and addressed by Army EOD personnel.
- c. If UXO encountered is determined to be immediately unstable by the EOD specialists, the EOD team leader will mark the location of the UXO and contact the ICF KE Representative on-site, who will in turn contact the Fort Hamilton Environmental Coordinator.
- d. Using marking stakes and lines as necessary, EOD specialists will mark the outer perimeter of the cleared area.
- e. EOD personnel will then conduct a survey of the area to locate metal objects to a minimum depth of 2 feet. All metal contacts will be marked with stakes.
- f. EOD personnel will use stakes to mark the exact location of the sampling sites as directed by the ICF KE Geologist.
- g. The area thus cleared and marked will then be certified as safe by the EOD supervisor. Sampling and drilling personnel and equipment can safely be driven into this area and surface sampling can be conducted.

**Downhole Screening for Geoprobe and possible Soil Boring and Monitoring Well Installation.** EOD subcontractor personnel will be present during all geoprobe/drilling and boring operations in the specified areas and will clear pathways to all locations where activity is scheduled. Clearing activities at Fort Totten will be conducted using standard EOD procedures and safety precautions.

The Foerster Electromagnetic Detector (MK 26 Ordnance Locator) will be used for the subsurface survey. The MK 26, the locator most recently approved by the military, is used by U.S. military EOD forces for detecting subsurface ordnance items. The locator is a hand-held unit that uses two fluxgate magnetometers, aligned and mounted a fixed distance apart, to detect changes in the earth's ambient magnetic field caused by ferrous metal or disturbances caused by soil conditions. An audio and a metered signal are provided to the operator. The metered signal indicates whether the disturbance is geodetic or metal-related. The detection capability of the MK 26 depends on the size and depth of the metal object and on the experience of the operator. The MK 26 can easily detect a 60-mm projectile to a depth of 2 feet and a 155-mm projectile to 7 feet.

Before geoprobe, well installation or soil boring begins, EOD specialists will use locators to surface sweep the access paths to the sampling sites, clearing a minimum access way 25 feet wide and a sampling area approximately 60 feet in diameter.

Before activities commence, subsurface surveys will be conducted. After the surface scan for UXO, EOD personnel will hand auger to a depth of 2 feet. The hand auger will then be removed from the hole, and a temporary PVC casing will be inserted. The MK 26 ordnance locator will then be inserted into the PVC casing and lowered to scan the entire length of the borehole. After the EOD specialists determine that the hole and the next 2-foot interval to be drilled are free of ordnance, the PVC casing will

be removed and the EOD personnel will continue to advance the hand auger. This procedure will be repeated every 2 feet for a minimum depth of 10 feet. If a significant metallic contact is discovered at any point in the downhole survey, the sampling site will be abandoned and a new sampling site, at least 10 feet from the old one, will be selected.

In the event that hand auger proves to be inappropriate due to high soil density or size of cobbles encountered, the screening procedure will be performed using a powered auger or drill rig. As described above, once the auger has advanced 2 feet, the auger will be removed from the borehole and a temporary PVC casing will be inserted. The drill rig will be moved away from the borehole to prevent signal interference during the downhole survey. After the EOD specialist has determined that the next 2-foot interval is free of ordnance, the PVC casing can be removed and the drill rig will be repositioned over the hole to resume drilling the next 2 feet.

## **2.8 SAMPLE PREPARATION AND SHIPPING**

Samples will be returned to the sample preparation area at the end of each day. The samples will be prepared by the site personnel for shipment to the laboratory in the following manner:

- Sample bottles will be removed from the field cooler and inspected for integrity;
- Labels and chains of custody will be inspected for completeness;
- Sample bottles will be wrapped with bubble wrap;
- The bottom and sides of a clean cooler will be lined with bubble wrap or styrofoam packing material;
- Samples will be placed in the cooler using additional bubble wrap between bottles to provide a snug fit;
- Double-bagged ice or blue ice sealed in zip-lock bags will be placed above the sample bottles;
- Additional bubble wrap or styrofoam packing material will be placed above the blue ice to fill any remaining space in the cooler;
- The Chain-of-Custody forms will be placed in a zip-lock bag and the bag will be taped to the inside of the cooler lid;
- The lid will be secured to the cooler with duct tape; and
- ICF KE personnel will deliver the cooler(s) to the shipping agent.

## **2.9 DECONTAMINATION PROCEDURES**

All equipment that comes into contact with potentially contaminated material will be decontaminated prior to use at each sampling location. Decontamination procedures for field equipment are described in the following sections. All equipment will be thoroughly decontaminated before use and between sampling locations.

### **Geoprobe/Drilling Equipment**

- All geoprobe/drilling equipment, including the drill rigs, geoprobe rods, augers, drill rods, and backhoes, will be steam cleaned with tap water.

### **Well Construction Materials**

- All well construction materials including tubing, casing, screen, and caps will be steam cleaned and rinsed with deionized water prior to installation. All material such as labels, stickers, etc. will be removed from the construction materials;

### **Sampling Materials**

- Stainless steel hand augers, bowls, split-spoons, geoprobe samplers, and other soil sampling equipment will be cleaned with a tap water and Alconox wash, rinsed with tap water, rinsed with deionized water, and rinsed twice with pesticide-grade isopropanol.
- Dedicated precleaned teflon bailers will be used and will therefore not require decontamination.
- Exterior surfaces of submersible pumps and hoses will be cleaned by an alconox wash and rinsed with tap water and deionized water. Interior parts of the pump and hoses will be cleaned by purging a minimum of 8 gallons of tap water through the pump. All sample tubing will be dedicated to a single well and discarded after use.
- Measuring tapes, probes, transducers, and other measuring equipment will be cleaned in an alconox wash and rinsed with raw water and deionized water.

All decontaminated equipment will be stored on clean pallets or plastic sheeting in a designated area. Equipment stored for long periods will be covered with clean plastic sheeting or placed in clean plastic bags. Monitoring equipment will be protected from contamination to the extent possible using a protective covering such as a plastic bag. Any direct contamination will be removed with a disposable wipe.

### 3.0 FIELD SAMPLING PROGRAM AND REMEDIATION AT FORT TOTTEN

Fort Totten is located in northeast Queens County, Long Island, New York. The facility is situated on a peninsula extending out into Little Neck Bay and consists of the "Old Fort" area, which covers approximately 1/4 of the site to the north, and the "New Fort" area to the south and east (Exhibit 3-1). A complete site map for Fort Totten is provided in Appendix B. The Old Fort area was built by the U.S. Army in 1860 and has since been designated as a Federal Historic Site. Portions of the facility are to be excessed or transferred as part of the BRAC. The following sections describe environmental sampling activities to be performed at the facility. Exhibits 3-2 and 3-3 summarize the soil and groundwater sampling programs at Fort Totten, respectively.

#### 3.1 OLD GARAGE AREA SUBSURFACE SOIL INVESTIGATION

As part of a Site Investigation for Soil Contamination at Fort Totten and Fort Hamilton completed in June 1995, four soil borings were completed in the vicinity of Building 204 (Old Garage Area) which has been demolished (Exhibit 3-4). This area was reportedly a garage used as an oil house and pesticide control shop. Based on the results of soil analyses, additional soil sampling will be conducted in the vicinity of previous boring location B10. Lead was detected at a concentration of 4,740 mg/kg in sample B10.<sup>1</sup> The follow-on soil sampling at this location is designed to determine the leachability of lead in soil at the B10 location.

**Soil Sampling and Analysis:** A single soil boring will be advanced using a hollow-stem auger (HSA) drilling rig with split-spoon sampling near the location of previous boring B10. Soil samples will be retrieved at three depth intervals sampled previously (4-6', 9-11', and 15-17' bgs) to a total depth of 17 ft. bgs. Sample aliquots from each depth interval will be collected and composited. The composited sample will be analyzed for the Toxicity Characteristic Leaching Procedure (TCLP) for Pb. Following sample collection, the boring will be backfilled with the soil cuttings and the boring location will be clearly recorded to map accuracy.

#### 3.2 REMEDIAL INVESTIGATION NEAR BUILDING 107

Building 107 is located at the intersection of Duane and Undermill Roads, just east of the main fort entrance, and was reportedly used as an engineering storehouse (Exhibit 3-5). Elevated levels of mercury and chromium were previously detected in shallow soil samples collected along the southern and western fence perimeters of Building 107. As a result, further soil and groundwater sampling and analysis will be conducted in an attempt to delineate the extent of metals contamination.

**Soil Sampling and Analysis:** A total of 10 surface soil samples will be collected and analyzed for target analyte list (TAL) inorganics. The soil samples will be collected from areas along the south and west perimeter fence where elevated levels of mercury and chromium were previously detected in soil. In addition, four soil borings will be completed through the pavement. Three samples will be collected per boring to a depth not to exceed the water table. Samples will be analyzed for target compound list (TCL), VOCs, SVOCs, pesticides/PCBs, and TAL inorganics and sufficient soil will be collected and sent to the laboratory for possible TCLP (Hg and Cr) analysis. The decision to perform the TCLP analysis will be made by the Fort Hamilton Environmental Office based on the results of the TAL inorganics analysis.

<sup>1</sup>As documented in the June 1995 Site Investigation report, this soil sample contained pieces of wire which may have resulted in the elevated concentrations of lead detected.

### 3.3 LITTLE BAY SHORELINE SITE INVESTIGATION

A total of 14 sediment samples will be collected from approximately 1,400 feet of shoreline in front of the southern portion of the Old Fort (BRAC Parcel 62 - Little Bay Shoreline) and west of Buildings 600-604 (Little Bay Shoreline) (Exhibit 3-6). The sediment samples will be collected to investigate potential mercury contamination resulting from reported spills at the adjacent U.S. Coast Guard property.

**Sediment Sampling and Analysis:** Eight sediment samples will be collected along the shoreline west of Buildings 600-604. Six sediment samples will be collected along the shoreline along the southern portion of the Old Fort Area. All of the sediment samples will be analyzed for mercury.

### 3.4 REMEDIAL INVESTIGATION OF HYDROCARBON CONTAMINATION NEAR BUILDING 602

As part of a Site Investigation for Soil Contamination at Fort Totten and Fort Hamilton completed in June 1995, four soil borings were completed in the vicinity of a former 2,000-gallon gasoline UST located near Building 602 (Exhibit 3-7). Elevated levels of total petroleum hydrocarbons (TPH) were detected downgradient from the tank. Soil samples from boring B12 contained 3,300 mg/kg TPH and soil samples from boring B13 contained 41,600 mg/kg TPH. The UST was removed in late 1995, however, results of analyses of soil samples collected from the tank excavation are not yet available. The follow-on soil sampling at this site is designed to better define the horizontal and vertical extent of hydrocarbon contamination in soils.

**Soil Sampling and Analysis:** Using the geoprobe soil sampling technique, three soil samples per point will be collected from 15 locations. The samples will be collected from two depth intervals above the water table and at a depth interval corresponding to the water table. Soil samples will be field screened using a PID. Based on the PID field screening and potential visual signs of contamination, 10% or 5 samples will be analyzed using USEPA Standard Methods 8021 and 8270.

### 3.5 OLD FORT SITE INVESTIGATION

Building 617, located within the Old Fort area (BRAC Parcel 78) was a tinsmith shop and possibly supported industrial activities related to torpedo and mine development. Mercury was reportedly used in this area (Exhibit 3-8). Environmental sampling will be performed to assess potential impacts to the subsurface from these activities. A UXO survey clearance of the proposed soil sampling locations and access routes for drilling equipment will be conducted as described in Section 2.0 of this Workplan.

**Soil Sampling and Analysis (BRAC Parcel 78):** Soil samples will be collected using a geoprobe at two locations downgradient of Building 617. Soil samples will be collected from each location at two depth intervals above the water table and at a depth interval corresponding to the water table. The soil samples from each geoprobe location will be composited and analyzed for TCL VOCs, SVOCs, pesticides/PCBs, and TAL inorganics.

**Groundwater Sampling and Analysis (BRAC Parcel 78):** Two shallow groundwater samples will be collected using the geoprobe sampling technique. The samples will be analyzed for TCL VOCs, SVOCs, pesticides/PCBs, TAL inorganics and cyanide.

The soils and groundwater in an area designated as BRAC Parcel 61 may be contaminated from reported spills that occurred at the adjacent U.S. Coast Guard drum storage area (Exhibit 3-8). Environmental sampling will be performed to assess potential impacts from these spills.

**Soil Sampling and Analysis (BRAC Parcel 61):** Soil samples from one location will be collected using a geoprobe at two depth intervals above the water table and at a depth interval

corresponding to the water table. The soil samples will be composited and analyzed for TCL VOCs, SVOCs, pesticides/PCBs, and TAL inorganics.

Groundwater Sampling and Analysis (BRAC Parcel 61): One shallow groundwater samples will be collected using the geoprobe sampling technique. The samples will be analyzed for TCL VOCs, SVOCs, pesticides/PCBs, TAL inorganics and cyanide.

### 3.6 PARADE GROUNDS SITE INVESTIGATION OK

A carnival held during the summer of 1994 on the Parade Grounds resulted in the spill of an unknown quantity of hydraulic fluid (**Exhibit 3-9**). Two 55-gallon drums of contaminated soil was removed from the area designated as BRAC Parcel 60, but no environmental sampling was performed to verify that no further contamination was present. Environmental sampling will be performed to assess potential impacts from this spill.

Soil Sampling and Analysis (BRAC Parcel 60): Soil samples from one location at the reported spill site will be collected using a geoprobe at two depth intervals above the water table and at a depth interval corresponding to the water table. The soil samples will be composited and analyzed for USEPA Standard Methods 8021, and 8270.

### 3.7 BUILDING 337 SITE INVESTIGATION ✓

Building 337 was former hazardous materials storage building that has since been demolished. Remaining at the site is a concrete pad containing a single transformer (**Exhibit 3-9**). Results from the Draft Environmental Baseline Survey (EBS) Report completed in March 1996 indicate that potential subsurface contamination of PCBs may have occurred at this site (designated as BRAC Parcel 77) from ~~reported~~ spillage of dielectric fluid from the transformer. In addition, a heating oil UST servicing Building 336 was removed in 1995 from an area adjacent to Building 337. Results from soil samples collected as part of the tank removal are not yet available. Environmental sampling will be performed at this location to assess potential impacts from spills. EBS

Soil Sampling and Analysis (BRAC Parcel 77): Two surface soil samples will be collected from areas immediately adjacent to the concrete transformer pad and analyzed for TCL VOCs, SVOCs, pesticides/PCBs, and TAL inorganics.

### 3.8 BRAC PARCEL 59 SITE INVESTIGATION

This area is located along Murray Avenue, adjacent to the USARC enclave and near Buildings 123 and 200 where releases of #2 heating oil were reported in 1994 (**Exhibit 3-10**). Environmental sampling will be performed at this location to assess potential impacts from these spills.

Groundwater Sampling and Analysis (BRAC Parcel 59): One shallow groundwater samples will be collected using the geoprobe sampling technique. The samples will be analyzed for TCL VOCs, SVOCs, pesticides/PCBs, TAL inorganics and cyanide.

### 3.9 GROUNDWATER MONITORING AT FORT TOTTEN

A total of nine groundwater monitoring wells will be installed at Fort Totten. Two monitoring wells will be installed to supplement the current well network designed to monitor the former landfill area (BRAC Parcel 74). Two wells will be installed to monitor potential groundwater contamination associated with Buildings 107 and 108. Two wells will be installed downgradient of the former sewage treatment plant

(STP) (Buildings 109-113), and one well will be installed downgradient of Building 102 to monitor potential groundwater contamination associated with the former STP and landfilling operations that reportedly occurred there. In addition, one upgradient well will be installed north of Building 107. Wells will be constructed as described in Section 2.2.2 of this Workplan and will be installed to a depth of approximately 25-30 ft. bgs. A map showing the proposed monitoring well locations is presented as Exhibit 3-11.

*Now  
Along?  
Not Clear*

Groundwater Sampling and Analysis (Buildings 107, 108, STP, and Landfill) The nine monitoring wells will be sampled every 3 months for a total of 6 sampling rounds. Samples obtained during the first two sample rounds will be analyzed for TCL VOCs, SVOCs, pesticides/PCBs, TAL inorganics and cyanide. Analysis of samples obtained in subsequent rounds will focus on selected parameters based on the first two sampling round results. The analytical suite for the subsequent sampling rounds will be determined based on review of the initial data by the Fort Hamilton Environmental Office and the NYSDEC.

A total of two composite samples will be collected from containerized drill cuttings and analyzed for full TCLP. A final decision concerning the disposition of the containerized material will be determined based on the TCLP results and on discussion with the Fort Hamilton Environmental Office and NYSDEC.

#### **4.0 FIELD SAMPLING PROGRAM AND REMEDIATION AT BELLMORE U.S. ARMY RESERVE MAINTENANCE FACILITY**

The Bellmore U.S. Army Reserve Maintenance Facility (Bellmore) is located in North Bellmore, Long Island, New York (Exhibit 4-1). The facility has been closed since October 1994 and is currently vacant except for Building 200, a former administration building, which is being leased to the local police department. Other buildings at Bellmore include Building 100 (maintenance shop), Building 300 (administration/ supply), Building 600 (garage), and Building 700 (storage shed) (Exhibit 4-2). The maintenance shop serviced a variety of equipment and vehicles including automobiles, missile systems, specialized mechanical, electrical, and electronic equipment, artillery, small arms, radar, photographic power generators, and construction equipment.

A Preliminary Environmental Site Investigation was performed by Staunton Chow Engineers in November 1994 that included limited soil and sludge sampling in the vicinity of potentially contaminated areas. The entire facility is to be excessed or transferred as part of BRAC '95. The following sections describe environmental sampling and remediation activities to be performed at the facility. Exhibits 4-3 and 4-4 summarize the soil and groundwater sampling programs at Bellmore, respectively.

#### **4.1 REMOVAL OF OIL/WATER SEPARATORS, DRY WELLS AND WASHRACK**

Four oil/water separators, three servicing Building 100 and one servicing a vehicle washrack, will be cleaned-out, excavated and removed (Exhibit 4-5). Effluent from each of the oil/water separators is discharged to nearby dry wells on-site. Seven of these dry wells and their associated piping will also be excavated and removed. The dry well receiving effluent from the washrack will not be removed since it serves as a storm water collection point; the washrack drain, associated oil/water separator, and piping will be removed.

Oil/Water Separators: The removal of the oil/water separators will generally proceed in the following manner:

- 1) Piping leading from the building to the oil/water separator will be flushed clean with potable water and containerized in the oil/water separator;
- 2) Interior building drains will be sealed with concrete;
- 3) Liquid and/or sludge in the oil/water separators (if present) will be sampled and submitted to the laboratory for quick turn-around full TCLP analysis;
- 4) The contents of the oil/water separator will then be pumped out and temporarily staged at the site pending analytical results. Based on the analytical results of liquid/sludge samples, the material will be properly disposed of off-site;
- 5) The oil/water separators will be inspected for cracks/holes and then the oil/water separators and piping leading to the dry wells will then be removed. Construction debris (i.e, concrete, piping) will be disposed of off-site.
- 6) Soil beneath the oil/water separator will be screened with a PID and visually inspected for evidence of contamination. If contamination is suspected, one soil sample will be collected per oil/water separator from soil immediately below the base of the excavation and analyzed for TCL VOCs, SVOCs, pesticides/PCBs, TAL inorganics and cyanide;
- 7) If contamination is evident, stockpiled soil will be sampled for full TCLP analysis and the excavation will remain open pending sampling results. Based on the results of the

analysis which will be compared to NYSDEC soil guidance values, the soil will be properly disposed of off-site or replaced in the excavation. Based on the disposition of the soil, the excavation will either be backfilled and supplemented with approved clean fill, or backfilled with only clean fill.

Dry Wells: The removal of the dry wells will generally proceed in the following manner:

- 1) The sides of the dry well and all gravel at the base of the dry well will be removed and disposed of off-site;
- 2) Soils beneath the dry well will be screened with a PID and visually inspected for evidence of contamination. Regardless of field observations, one sample will be collected from the base of each dry well and analyzed for TCL VOCs, SVOCs, pesticides/PCBs, TAL inorganics and cyanide; and
- 3) If contamination is evident, stockpiled soil will be sampled for full TCLP analysis and the excavation will remain open pending sampling results. Based on the results of the analysis which will be compared to NYSDEC soil guidance values, the soil will be properly disposed of off-site or replaced in the excavation. Based on the disposition of the soil, the excavation will either be backfilled and supplemented with approved clean fill, or backfilled with only clean fill.

Washrack: The washrack drain, associated oil/water separator and piping to the nearby dry well will be removed. The removal will proceed in the following manner:

- 1) Liquid and/or sludge in the oil/water separators (if present) will be sampled and submitted to the laboratory for quick turn-around full TCLP analysis;
- 2) The contents of the oil/water separator will then be pumped out and temporarily staged at the site pending analytical results. Based on the analytical results of liquid/sludge samples, the material will be properly disposed of off-site;
- 3) The drain and piping leading to the oil/water separator will be removed with minimal disturbance of the concrete washrack.
- 4) The oil/water separator and piping leading to the dry well will be removed.
- 5) Soil beneath the drain, piping and oil/water separator will be screened with a PID and visually inspected for evidence of contamination. If contamination is suspected up to six soil samples will be collected from soil immediately below the base of the excavation and analyzed for TCL VOCs, SVOCs, pesticides/PCBs, TAL inorganics and cyanide;
- 6) If contamination is evident, stockpiled soil will be sampled for full TCLP analysis and the excavation will remain open pending sampling results. Based on the results of the analysis which will be compared to NYSDEC soil guidance values, the soil will be properly disposed of off-site or replaced in the excavation. Based on the disposition of the soil, the excavation will either be backfilled and supplemented with approved clean fill, or backfilled with only clean fill.

#### **4.2 UST INVESTIGATION**

One 10,000-gallon #2 fuel oil tank, one 15,000-gallon #2 fuel oil tank, and one possible gasoline tank of unknown size will be investigated for potential environmental releases. The 15,000-gallon tank is located on the southeast end of Building 100. The 10,000-gallon tank is located on the northeast end of

Building 100 (Exhibit 4-5). The two fuel oil tanks are reportedly constructed of steel and were installed in the late 1950's. These tanks were reportedly closed in place in 1982, however, no environmental sampling information related to the tanks is available.

Soil Sampling and Analysis for Fuel Oil USTs Closed in Place: Four soil borings will be completed adjacent to and downgradient of each of the fuel oil USTs using a HSA drilling rig. Soil samples will be collected with a split-spoon sampler at five-foot intervals to the base of the tank (approximately 10 feet bgs) and then continuously to the water table (12-18 ft bgs). Soil samples and drill cuttings will be monitored with a PID and visually inspected for evidence of contamination. According to NYSDEC SPOTS Memo #14, soil samples will be collected from 2-4 feet below the base of the tank and at the water table. These soil samples will be analyzed using USEPA Standard Methods 8021 and 8270.

A possible gasoline tank of unknown size, age, and construction may be present immediately south of Building 600 (garage) as indicated by a vent pipe located along the southern wall of the garage and the nearby concrete slab of a former pump island. No records of removal or environmental sampling for this tank were available. Therefore, a magnetic survey will first be conducted in the area immediately south of Building 600 to determine whether a steel UST is present. Depending on the results of the magnetic survey, soil sampling will be conducted by option A or B described below:

Option A: Soil Sampling and Analysis for Confirmed Gasoline UST If a tank is present, the removal of the tank will proceed according to the steps outlined in Section 2.6.3 of this Workplan. Excavated soils will be monitored with a PID and visually inspected for evidence of contamination.

Soil samples will be collected from the excavation as follows:

- beneath the fill pipe or around the manway (one sample);
- immediately beneath each end of the tank (two samples); and
- from 2-3 feet below each end of the tank (two samples).

In addition, the remains of the concrete pump island and associated piping will be removed and a single soil sample will be collected beneath these features. Soil sample collection will be biased towards soils having highest PID readings and/or visual evidence of contamination. All soil samples will be analyzed using USEPA Standard Method 8021.

Excavated soil will be stockpiled on plastic and sampled. Three composite soil samples will be analyzed using USEPA Standard Method 8021 on a quick turn-around basis. Based on the results of the analysis which will be compared to NYSDEC soil guidance values, the soil will be properly disposed of off-site or if clean, replaced in the excavation. Based on the disposition of the soil, the excavation will either be backfilled and supplemented with approved clean fill, or backfilled with only clean fill. Concrete, the empty tank and metal debris generated from the removal activities will be transported off-site for proper disposal.

Option B: Soil Sampling and Analysis for Unconfirmed UST If no evidence of a tank is detected, limited confirmation excavation will be completed to approximately 3 feet bgs in the area immediately south of the garage. Assuming, the excavation results are negative, one boring will be completed to the water table (12-18 ft bgs) in the suspected former tank location. One soil sample will be collected at the water table and analyzed for USEPA Standard Method 8021. The remains of the concrete pump island and associated piping will be removed; a single soil sample will be collected beneath these features and analyzed for USEPA Standard Method 8021.

#### **4.3 BUILDING 700 LEAD ABATEMENT**

Building 700 is located to the south of Building 100 and was previously used for flammable materials storage. The building measures approximately 20 x 25 x 12 ft. The walls and roof are constructed of sheet metal and the floor consists of several concrete slabs. The interior and exterior roof and walls are covered with paint that is now peeling and flaking off. Previous sampling around the perimeter of the building revealed that elevated concentrations of lead were present in the soil at depths of 6-8 inches bgs.

Lead Paint Abatement: To remove the potential for additional soil contamination, the peeling paint on the building will be scraped of all loose paint and then covered with a sealant as described in section 2.0 of this Workplan.

Soil Removal, Sampling and Analysis: Following the paint abatement, removal of soil and the concrete slabs inside the building will proceed as follows:

- The concrete slabs inside the building will be removed and inspected. If the concrete shows signs of contamination, a sample of the concrete will be collected and submitted for full TCLP analysis prior to off-site disposal. If no signs of contamination are evident, the concrete will be properly disposed off-site.
- The top 8 inches of soil will then be removed from inside the building and from a 10-foot perimeter surrounding the building. Three composite soil samples will be collected from the stockpiled soil and analyzed for TCLP (Pb) on a quick turn around basis. Based on the results of the composite analysis, the soil will be properly disposed of off-site.
- Following the removal, ten confirmatory surface soil samples will be collected from the excavation and analyzed for Pb.
- The excavated area will be graded.

#### **4.4 LEAD-BASED PAINT SURVEY**

To determine the presence/absence of lead-based paint on building surfaces at Bellmore, up to 30 paint chip samples will be collected from interior and exterior homogenous surface areas in accordance with the guidelines outlined in Section 2.3.4 of this Workplan. All samples will be analyzed for Pb.

#### **4.5 SOIL SAMPLING OF DRAINAGE DITCH**

A drainage ditch, approximately 1,000 feet in length, extends along the western perimeter of Bellmore behind Building 100 (Exhibit 4-5). Stormwater runoff collected by the ditch is carried from north to south across the property which has a vertical relief of approximately three feet. To determine the potential environmental impact of previous site activities to the drainage ditch, subsurface soil sampling will be performed.

Soil Sampling and Analysis: Ten shallow soil (0.5-1.5 ft bgs) samples will be collected at 100-foot intervals along the bottom of the drainage ditch using a hand auger. The soil samples will be analyzed for TCL VOCs, SVOCs, Pesticides/PCBs, and TAL inorganics.

#### 4.6 SOIL SAMPLING OF FORMER LEACHFIELD

The former leachfield area is located east of Building 100 and south of the washrack (Exhibit 4-5). The area is approximately 200 x 200 ft and is covered by grass. The septic system has been reportedly taken out of service but it is unknown if the tanks or piping have been removed. To determine the potential environmental impact of previous site activities to the former leachfield, subsurface soil sampling will be performed.

Soil Sampling and Analysis: Four soil borings will be completed to depths of approximately 15 ft bgs in the vicinity of the leachfield. One soil sample per boring will be collected for analysis. Samples will be collected in each boring from 0-1', 5-7', 10-12' and 15-17' ft bgs and composited. Soil samples will be analyzed for TCL VOCs, SVOCs, pesticides/PCBs and TAL inorganics.

#### 4.7 GROUNDWATER MONITORING

To determine whether previous operations at Bellmore have impacted groundwater, eight groundwater monitoring wells will be installed on the property. No other monitoring wells currently exist at the site. Based on topography, the groundwater flow direction appears to be from north to south. Groundwater was encountered at 12 ft bgs in soil boring activities performed for UST installations in 1982. Soil borings drilled during a Preliminary Environmental Site Investigation conducted in November 1994 encountered groundwater at 18 ft bgs.

The proposed locations of the monitoring wells are designed to evaluate groundwater quality entering the property from the north, leaving the property to the south, and at several previously identified contaminated areas. Specific proposed well locations are as follows: the two upgradient wells will be installed along the northern perimeter fence; three wells will be installed along the southern perimeter fence; one well will be installed downgradient of dry well W100G; one well will be installed in the vicinity of the abandoned septic tank; and one well will be installed in the vicinity of Building 700 and dry well N100C (see Exhibit 4-5).

Groundwater Sampling and Analysis: Six rounds of groundwater samples will be collected every three months from each monitoring well according to the procedures outlined in Section 2.2.4.1 of this Workplan. The first two rounds of groundwater samples will be analyzed for TCL VOCs, SVOCs, pesticides/PCBs, TAL inorganics and cyanide. Analysis for subsequent sampling rounds will focus on selected parameters based on the results of the first two sampling rounds.

## **5.0 CONTRACTOR QUALITY CONTROL**

This section describes the QC organization and program for project activities performed at Fort Totten and Bellmore under the Baltimore TERC contract, Delivery Order 0006. The requirements and systems established herein are relevant and applicable to project work performed by ICF KE and our subcontractors and suppliers.

The objectives of this QC program are to anticipate the specific operating requirements of the project, and to establish procedures to ensure that achieved quality meets technical design specifications and conforms to the requirements of the contract. Specifically, this section:

- Identifies the project QC organization and defines each individual's respective authority, responsibilities, and qualifications.
- Defines project communication, documentation, and record keeping procedures.
- Establishes QC procedures, including the necessary supervision and tests to ensure that all work meets applicable specifications and drawings.

This project-specific QC program was developed in accordance with the Baltimore TERC contract and Delivery Order; minutes and discussions from the project Coordination meeting; USACE ER 1180-1-6: Construction Quality Management (1 Apr 91), USACE ER 1110-1-12: Engineering and Design Quality Management (1 June 93), and USACE ER 415-1-10: Contractor Submittal Procedures (30 Jun 91); and the ICF KE QC Program for USACE Contracts (i.e., the ICF KE Corporate Contractor Quality Control Plan, CORP-QA-0005A, and Chemical Quality Management Plan, CORP-QA-0005B).

### **5.1 CQC ORGANIZATION**

The organization established for this project is depicted in **Exhibit 1-1**. Additional QC staff may be added as necessary to meet QC requirements for each definable feature of work. Quality related responsibilities and authority of each member of this organization are outlined below.

#### **5.1.1 Project Manager**

Mike Kipp, the Project Manager reports to the Total Environmental Restoration Contract (TERC) Program Manager, Chuck Debelius, and is responsible for the quality and timeliness of all project activities, including those performed by subcontractors. Specifically, the Project Manager is responsible for implementing this QC program and supporting the efforts of the CQC System Managers and their staff.

#### **5.1.2 Contractor Quality Control System Manager**

Each Contractor Quality Control System Manager (CQC) System Manager supports the Project Manager in day-to-day operations and reports to Yvonne Fernandez, the FPG Quality Manager. Each CQC System Manager has sufficient authority, including stop work authority, to ensure that project activities comply with applicable specifications of this QC program, and the contract and Delivery Order. This authority applies equally to all project activities, whether performed by ICF KE or its subcontractors and suppliers.

Within the jurisdiction of each site, the CQC System Manager is responsible for planning and execution of QC oversight of project operations, and ensuring compliance with specified QC requirements. Specifically, the CQC System Manager is responsible for: (1) developing, assessing the effectiveness of, and maintaining this QC program and related procedures; (2) reviewing the qualifications of proposed technical staff and subcontractors; (3) planning and ensuring the performance of preparatory, initial, follow-up, and completion inspections for each definable feature of work; (4) identifying quality problems

and verifying corrective actions; (5) ensuring that the requisite QC records are generated and retained as prescribed in this QC program; and (6) verifying that subcontracted laboratories have and operate under a QC program that complies with this QC program and applicable requirements of the contract and Delivery Order. The CQC System Manager is also responsible for notifying the COR 48 hours in advance of beginning any of the required action of the preparatory phase, and 48 hours in advance of beginning the initial phase. As a minimum, the Daily QC Reports may be used for purposes of notification. The CQC System Manager is to be physically on-site during any removal actions.

## **5.2 PERSONNEL QUALIFICATION AND TRAINING**

Project staff shall be qualified to perform their assigned jobs. This is accomplished by establishing and enforcing minimum qualification requirements for key positions, verifying initial and continued personnel proficiency, and implementing a formal training program.

### **5.2.1 QC Staff**

Minimum qualifications for the CQC System Managers and the QC staff, including the CQC System Manager alternate, are provided in the ICF KE QC Program for USACE Contracts. The qualifications of proposed QC personnel are to be reviewed and verified against these specifications. QC personnel are not to be assigned a position or job for which they do not meet the minimum qualifications.

The CQC System Managers and QC staff are to be trained by the FPG Quality Manager on ICF KE QC requirements for USACE remediation projects. This training program is to provide appropriate indoctrination regarding applicable contractual and corporate QC requirements, with a primary focus on problem prevention. The FPG Quality Manager is to certify the CQC System Managers to train ICF KE Project Managers and technical staff.

QC personnel conducting or monitoring inspection activities are to be certified in accordance with established ICF KE protocols. Personnel who plan, perform, or monitor quality audits are to be certified as Auditors-in-Training, Auditors, or Lead Auditors in accordance with ICF KE protocols.

### **5.2.2 Project Personnel**

Minimum qualification requirements for key positions on this project are to be established through review of contractual and other project-related requirements. The qualifications of proposed personnel are to be reviewed and verified against these specifications. Project personnel are not to be assigned a position or job for which they do not meet the minimum qualifications.

Senior technical staff are to provide on-the-job training to newly assigned technical staff related to their job requirements and techniques and with particular emphasis on problem prevention. Work performed by newly assigned staff is to be monitored by senior staff. The frequency of monitoring depends on the individual's demonstrated proficiency to perform his or her assigned duties.

### **5.2.3 Subcontractor Qualifications**

The corresponding CQC System Manager is responsible for verifying that subcontractors possess the requisite qualifications prior to procurement. This is to be performed as prescribed in the ICF KE QC Program for USACE Contracts. Subcontractors to ICF KE shall not subcontract their responsibilities on this project to a third party or organization without prior and written approval of the ICF KE Project Manager. ICF KE QC staff are to work with each major subcontractor to ensure that the subcontractor develops and implements a supplier QC program and internal training program that are comparable to the ones specified in the ICF KE QC Program for USACE Contracts.

#### **5.2.4 Health and Safety Training**

Health and safety (H&S) training requirements are to be established in accordance with ICF KE policies and procedures, specified in the project HASP, and met. As a minimum, site workers and QC staff who may encounter hazardous wastes are to have completed the Occupational Safety and Health Association (OSHA) Hazardous Material Site Worker Training (40-hr initial training and 8-hr annual refreshers). On-site operations managers are to have also completed the OSHA Hazardous Material Site Worker Training and 8-hour Supervisor Training.

#### **5.2.5 Documentation**

The review and verification of personnel qualifications are to be documented on the Personnel Qualification Verification Form. Completed forms (one per individual and function) and resumes for assigned project personnel will be provided upon request.

On-the-job training is to be documented using the ICF KE Record of Skills and Experience. Additional training and internal certification records are to be generated and retained by the organization or person giving the training/certification. Training records are to include the training syllabus, date(s), trainer(s), and attendees, and exam results (where applicable). Certification records are to include the name of the certifying agent, the name of the individual being certified, and the date and scope of certification.

### **5.3 SUBMITTAL MANAGEMENT**

Submittal management is a primary responsibility of the project management and QC staff. Submittal control is required to regulate the timely flow of materials and work, to ensure problem prevention, and to demonstrate that materials and work are in compliance with applicable specifications. Project submittal procedures are to be implemented as prescribed herein and in accordance with contract specifications.

#### **5.3.1 General Requirements For Submittals**

The Project Manager is responsible for overall management and control of project submittals. The designated CQC System Manager is responsible for submittal scheduling and tracking. The CQC System Manager is responsible for ensuring, through detailed review, that submittals, as well as the materials and work they represent, are in full compliance with applicable contract specifications. The CQC System Manager is also responsible for ensuring that a project file is established and maintained, and that accountable project documents are retained and controlled as prescribed in the ICF KE QC Program for USACE Contracts.

**Project submittals.** Submittals are to be listed and tracked using USACE Engineering Form 4288, Submittal Register. Submittals include deliverables whether generated on-site or off-site by ICF KE, subcontractors, fabricators, manufacturers, suppliers, or purchasing agents. Procurement documents for subcontracted services and materials are to list the submittals required of the subcontractor. The CQC System Manager is to review the list to ensure its completeness and may expand general category listings to show individual entries for each item. The approved Engineering Form 4288 becomes the scheduling document and is to be used to control submittals throughout the project.

**Project Records.** An on-site project file is to be established in accordance with ICF KE policies and contract specifications. The project file is to include a record copy of the following documents:

- Construction schedule and progress reports;

- Technical specifications, including addenda and modifications thereof;
- Change orders and other contract modifications;
- Engineer Field Orders;
- Manufacturer's certificates; and
- Daily work activity summary reports, including:
  - Reports on any emergency response actions
  - Test records
  - Records of site work
  - Chain-of-custody records
  - Reports on spill incidents
  - Truck load tickets and shipping papers
  - Laboratory results
  - Records on quantities of soil treated
  - Other items as required by the Contracting Officer

### **5.3.2 Submittal Scheduling**

The designated CQC System Manager is to establish and maintain a project submittal schedule that reflects the status on Engineering Form 4288. Submittal activities are to be incorporated into the construction schedule so that submittal progress can be tracked in conjunction with overall progress. Submittal schedules are to allow for evaluation, approval, procurement, and delivery prior to the preparatory phase and before the item is needed. The CQC System Manager is responsible for monitoring the progress of project submittals and keeping the Project Manager apprised. The submittal schedule is to be reviewed and updated on a weekly basis. Submittals covering component items that form a system or items that are interrelated are to be scheduled and submitted concurrently. Adequate time is to be allowed for required reviews and approvals.

### **5.3.3 Review and Approval of Submittals**

Prior to client delivery or use, project submittals are to be reviewed and approved by ICF KE. CQC System Manager certification and signature are required on each submittal. He/She is to review submittals prepared by ICF KE, subcontractors, and suppliers for completeness and compliance with the specifications of the Delivery Order and contract. Submittals related to construction equipment or materials are to be reviewed for contractual compliance, including compliance with the Buy American Act (FAR 52.225-0005 and 52.225-15). Noncompliant submittals are to be returned to the originator for corrective action and re-submittal to the CQC System Manager.

Prior to submittal to the CQC System Manager for certification, technical documents (e.g., reports, plans, and engineering drawings) are to be reviewed by qualified staff. Although part of the QC process, reviewers may include but are not limited to the QC staff. Specific protocols and requirements for this review are prescribed in FPG-SOP-003, Document Review. The distribution of this SOP is to be controlled by the CQC System Manager to ensure that individuals involved in its implementation have and use the most recent and approved version.

For each project document that is submitted for technical review, an ICF KE Document Review Form (included in the standard operating procedure (SOP)) is to be initiated by the author, submitted with the document to be reviewed, and used to document and track the review process. A copy of the completed Document Review Form is to be submitted to the CQC System Manager together with the corrected document for his/her review and certification. Each document is to provide a signature block for CQC System Manager certification. Original Document Review Forms, reviewer comments, and

annotated versions are to be retained with the deliverable in the project file and reviewed by the QC staff during project inspections.

#### **5.3.4 Transmittal of Submittals to Client**

Submittals to the client are to be accompanied by Engineering Form 4025. This form is to be used for submitting both USACE approved and information only submittals in accordance with the instructions on the reverse side of the form. This form is to be properly completed by filling out the heading blank spaces and identifying each item submitted. Care is to be exercised to ensure proper listing of the Delivery Order, specification paragraph, and/or sheet number of the plans pertinent to the data submitted for each item.

#### **5.3.5 Documentation of Submittals**

In addition to the documentation requirements specified above and in the Document Review SOP, the following requirements apply to this project. The QC file is to be maintained by the CQC System Manager and is to be controlled as an integral component of the project files. Shop drawings, work orders, and change orders issued for remedial actions are to be provided to the CQC System Manager. It is the responsibility of the CQC System Manager to maintain this technical information and keep it current and recorded as it is revised. Technical information is not to be replaced or revised without receipt of a properly authorized change order or revision. Copies of purchase orders or subcontracts requiring inspection are to be provided to the CQC System Manager for receiving and recording purposes. Copies of required certifications received are to be maintained in the QC file and are to be submitted to the client in accordance with agreements made at the coordination meeting. Changes in submittal progress and QC activities related to submittals are to be summarized in the Daily QC Report.

### **5.4 INSPECTION PHASES**

The CQC System Manager is responsible for verifying compliance with this QC program through implementation of the 3-phase control process. This process ensures that project activities comply with the approved plans and procedures. The specific QC monitoring requirements for the definable features of work for this project are discussed below. This section specifies the minimum requirements that must be met and to what extent QC monitoring must be conducted by the CQC System Manager.

#### **5.4.1 Implementation of the 3-Phase Inspection Process**

The designated CQC System Manager is to ensure that the 3-phase control process is implemented for each definable feature of work regardless of whether they are performed by ICF KE or its subcontractors. Each control phase is important for obtaining a quality product. However, the preparatory and initial inspections are particularly invaluable in preventing problems. Production work is not to be performed on a definable feature of work until a successful preparatory and initial phase inspection have been completed.

**Preparatory Phase Inspection.** Performed prior to beginning each definable feature of work. The purposes are to review applicable specifications and verify that the necessary resources, conditions, and controls are in place and compliant before the start of work activities. The CQC System Manager is to verify that lessons learned during previous similar work have been incorporated as appropriate into the project procedures to prevent recurrence of past problems. He/She is to generate and use a Preparatory Inspection Checklist. Work plans and operating procedures are to be reviewed by the CQC System Manager to ensure they describe pre-qualifying requirements or conditions, equipment and materials, appropriate sequence, methodology, hold/witness points, and QC provisions. He/She is to verify that the required plans and procedures have been prepared and approved and are available to the field staff; field equipment is appropriate for its intended use, available, functional, and properly calibrated;

responsibilities have been assigned and communicated; field staff have the necessary knowledge, expertise, and information to perform their jobs; arrangements for support services (such as asbestos abatement contractors and test laboratories) have been made; and prerequisite site work has been completed. Discrepancies between existing conditions and approved plans/procedures are to be resolved and corrective actions for unsatisfactory and nonconforming conditions identified during a Preparatory Inspection are to be verified by the CQC System Manager or his/her designee, prior to granting approval to begin work. Client notification is required at least 24 hours in advance. Results are to be documented in the preparatory inspection checklist and summarized in the Daily QC Report.

Initial Phase Inspection. Performed the first time the definable feature of work is performed. The purposes are to check preliminary work for compliance with procedures and specifications, establish the acceptable level of workmanship, and check for omissions and resolve differences of interpretation. The CQC System Manager, or his/her designee, is responsible for ensuring that discrepancies between site practices and approved specifications are identified and resolved. Initial inspection results are to be documented by the CQC System Manager in the QC logbook and summarized in the Daily QC Report. Discrepancies between site practices and approved plans/procedures are to be resolved and corrective actions for unsatisfactory and nonconforming conditions or practices are to be verified by the CQC System Manager or his/her designee, prior to granting approval to proceed. Client notification is required at least 24 hours in advance. Results are to be documented in the initial inspection checklist and summarized in the Daily QC Report.

Follow-up Phase Inspection. Performed each day the definable feature is performed. The purpose is to ensure continuous compliance and level of workmanship. The CQC System Manager is responsible for on-site monitoring of the practices and operations taking place and verifying continued compliance with the specifications and requirements of the contract, Delivery Order, and approved project plans and procedures. He/She is also responsible for verifying that a daily H&S inspection is performed and documented as prescribed in the project HASP. Discrepancies between site practices and approved plans/procedures are to be resolved and corrective actions for unsatisfactory and nonconforming conditions or practices are to be verified by the CQC System Manager or his/her designee, prior to granting approval to continue work. Follow-up inspection results are to be documented in the QC logbook and summarized in the Daily QC Report.

Additional Inspections. Performed on the same definable feature of work may be required at the discretion of the client or the CQC System Manager with approval by the client. Additional preparatory and initial inspections are generally warranted under any of the following conditions: unsatisfactory work, as determined by ICF KE or the client; changes in key personnel; resumption of work after a substantial period of inactivity (e.g., 2 weeks or more); changes to the project scope of work/specifications

Completion/Acceptance Inspection. Performed, upon conclusion of the feature of work and prior to closeout, to verify that project requirements relevant to the particular feature of work are satisfied. Outstanding and nonconforming items are to be identified and documented in a checklist. As each item is resolved, it is to be so noted on the checklist. Client acceptance and closeout of each definable feature of work is a prerequisite to project closeout.

#### **5.4.2 Inspection Procedures**

Receiving and Storage. The CQC System Manager is to inspect construction materials upon receipt and prior to use. Visual inspection criteria include identification, signs of damage or distortion, completeness, evidence of compliance with specifications, and associated documentation. Results of receiving inspections are to be documented in the QC log and summarized in the Daily QC Report.

Material Certification. Copies of purchase orders or subcontracts requiring receiving inspection are to be provided to the CQC System Manager for scheduling and record-keeping purposes. If a purchase order requires vendor certification of materials, equipment, or supplies, the certification is to be verified as to accuracy and conformance and may be used in lieu of a test for those properties covered by the certification. Copies of certifications are to be maintained in the project QC file and made available to the client upon request or submitted, as specified in the contract.

Inspection of Workmanship. The CQC System Manager is to inspect items that will be embedded in concrete pavements and areas that will be covered as a result of subsequent work. The CQC System Manager is to verify that installed items conform to applicable specifications prior to the placement concrete or covering. Identified deficiencies are to be communicated to the responsible individual and documented in the QC log and Daily QC Report. Corrective actions are to be verified by the CQC System Manager and recorded in the QC log and Daily QC Report.

Surveillance of Subcontractor Operations. The CQC System Manager is responsible for surveillance on project activities performed by subcontractors, as well as those performed by ICF KE. Discrepancies associated with subcontractor work are to be communicated to the subcontractor for resolution. The CQC System Manager and his/her staff have the authority to act directly with subcontractor representatives on routine QC activities. If a discrepancy is related to a concrete placement or will be covered by a subsequent operation, a resolution is to be made by the CQC System Manager or his/her designee prior to the item being covered.

#### **5.4.3 Documentation**

The ICF KE Inspection Schedule & Tracking Form (**Included In Appendix A**) is to be used by the designated CQC System Manager for planning, scheduling and tracking the progress of inspections for this project. The information on the form is to be kept up to date and reviewed by the CQC System Manager for planning purposes. Inspection activities and corrective actions are to be documented by the CQC System Manager as prescribed above and in accordance with the ICF KE QC Program for USACE Contracts. Inspection records are to be maintained as part of the project QC file.

### **5.5 DEFICIENCY MANAGEMENT/CORRECTIVE ACTION**

ICF KE's Quality Improvement Process (QIP) is comprised of the internal systems that evaluate our quality program's effectiveness in ensuring and continually improving the quality of our work. The primary goals of our QIP and the QC program defined in this document are to prevent nonconformances and facilitate continual process improvement. To the extent that the first of these goals is not achieved, identified deficiencies or non-conformances are to be corrected in a timely and cost-effective manner and with the intent of preventing their recurrence. This QC program includes provisions for preventing quality problems and facilitating process improvements as well as for identifying, documenting, and tracking deficiencies until corrective action has been verified.

#### **5.5.1 Continual Improvement**

Project staff at all levels are to be encouraged to provide recommendations for improvements in established work processes and techniques. The intent is to identify activities that are compliant but can be performed in a more efficient or cost-effective manner. Typical quality improvement recommendations include identifying an existing practice that should be improved (e.g., a bottleneck in production) and/or recommending an alternative practice that provides a benefit without compromising prescribed standards of quality. Project staff are to bring their recommendations to the attention of project management or the QC staff through verbal or written means. However, deviations from established protocols are not to be implemented without prior written approval by the Project Manager and concurrence of the CQC System

Manager. Where a staff-initiated recommendation results in a tangible benefit to the project, public acknowledgement is to be given by the Project Manager.

### **5.5.2 Deficiency Identification and Resolution**

Deficiency identification and resolution are primary responsibilities of the operational staff (both ICF KE and its subcontractors) and the Project Manager. In the interest of timeliness of corrective actions, a Type I Corrective Action Request (CAR) can be issued by any member of the project staff whether an ICF KE or subcontractor employee. If the individual issuing the CAR is also responsible for correcting the problem, then he or she should do so and document the results on Part B of the CAR. Otherwise, the CAR should be forwarded to the Project Manager designee (e.g., corresponding line manager), who is then responsible for evaluating the validity of the request, formulating a resolution and prevention strategy, assigning personnel and resources, and specifying and enforcing a schedule for corrective actions. Once a corrective action has been completed, the CAR and supporting information are to be forwarded to the CQC System Manager for closure. An example of the ICF KE Type I CAR is provided in **Appendix A**.

Each SOP is to identify common problems and recommended corrective actions to be taken by the individuals performing the operation. If the problem is resolved through the actions recommended in the SOP, the problem is to be documented as prescribed in the SOP. If an unexpected problem arises or if a problem anticipated in the SOP occurs frequently or is not easily resolved by the recommended actions, the problem is to be brought to the attention of project management verbally and through a Type I CAR. Project management concurrence of Part A: the Notice of Deficiency is only required when a CAR is issued outside the originator's work unit (e.g., sampling crew). Management review and concurrence of Part B: Corrective Action is required on each CAR prior to submittal for verification and closure.

While deficiency identification and resolution occurs primarily at the operational level, QC inspections provide a backup mechanism to address problems that either are not identified or cannot be resolved at the operational level. Through implementation of the inspection program prescribed in Section 6, the QC staff is responsible for verifying that deficiencies are identified, documented as prescribed herein, and corrected in a timely manner. Deficiencies identified by the QC staff are to be corrected by the operational staff and documented by the QC staff.

In addition to observing actual work operations, Type I CARs are to be reviewed during follow-up QC inspections. The purposes of this review are to ensure that established protocols are implemented properly, to verify that corrective action commitments are met, to ensure that corrective actions are effective in resolving problems, to identify trends within and among similar work units, and to facilitate system root cause analysis of larger problems. Particular attention is to be given by the QC staff to work units that generate either an unusually large or unusually small number of Type I CARs. Type II CARs are to be issued and tracked by the QC staff for major deficiencies identified during QC inspections and for problems not resolved through implementation of a Type I CAR. **Appendix A** includes an example of the ICF KE Type II CAR.

In response to each Type II CAR, a written Corrective Action Plan (CAP) is to be developed by a Project Manager designee and approved and signed by the Project Manager. The CAP is to indicate whether it is submitted for informational purposes or for review and approval. In either event, operational staff are to be encouraged to discuss corrective action strategy with the QC staff throughout the process. The ICF KE CAP is provided in **Appendix A**.

The CQC System Manager and his/her staff have full stop work authority for unresolved deficiencies.

### **5.5.3 Deficiency and Corrective Action Tracking**

Type I CARs are to be issued for problems identified by project staff during normal operations. Each Type I CAR is to be given a unique identification number and tracked by the appropriate line

manager until corrective actions have been taken and documented in Part B of the form, and the CAR is submitted to the CQC System Manager or his/her designee for verification and closure. Sufficient information is to be provided to allow the QC reviewer to verify the effectiveness of the corrective actions. If the QC reviewer determines that further action is required, then a Type II CAR is to be issued and tracked by the CQC System Manager or his/her designee until resolution.

Type II CARs are to be issued and tracked by the QC staff for major deficiencies identified during QC inspections and for problems not resolved through implementation of a Type I CAR. Each Type II CAR is to be assigned a unique and sequential number by a member of the QC staff and entered on the Type II Deficiency Tracking Log.

Deficiency logs are to be reviewed periodically by the CQC System Manager to verify that corrective action commitments are met. The CQC System Manager is also responsible for establishing and maintaining a CAR database for this project to facilitate trend analysis and prioritize prevention initiatives.

#### **5.5.4 Documentation**

Deficiencies are to be documented using CARs and the Daily QC Report. Problems identified by operational staff are to be documented as prescribed above. Problems that cannot be resolved at this level are documented by the QC staff on a Type II CAR. Minor deficiencies that are identified during a QC inspection but can be readily corrected and verified in the field are to be documented in the QC log and Daily QC Report. Deficiencies identified in a QC inspection but that cannot be readily corrected are to be documented by the QC staff on a Type II CAR and in the Daily QC Report. Type I CARs should be cited in the Daily QC Report. Copies of Type II CARs are to be referenced in and attached to the Daily QC Report.

Where a Type II CAR has been issued, a written CAP is to be prepared under the direction of the Project Manager and approved by the Project Manager. Type II CARs are to indicate whether or not the CAP also requires QC approval prior to implementation. Similar or related deficiencies may be addressed on a single CAP.

#### **5.6 REPORTS**

The designated CQC System Manager is responsible for the preparation and submission of the Daily QC Report to USACE with concurrent courtesy copies to the Project Manager and FPG Quality Manager. The original and one copy of the Daily QC Report with attachments are to be submitted to the designated USACE representative on the first work day following the date covered by the report. All calendar days, including weekends and holidays, are to be accounted for throughout this project. As a minimum, one report is to be prepared and submitted for every continuous seven days of no work.

The Daily QC Report is to provide an overview of QC activities performed each day, including those performed on subcontractor and supplier activities. The QC reports are to present an accurate and complete picture of QC activities. They are to report both conforming and deficient conditions, and should be precise, factual, legible, and objective. Copies of supporting documentation, such as checklists and surveillance reports are to be attached. The proposed format to be used is provided in Appendix A.

A field QC log is to be assigned to each CQC System Manager for use in documenting details of field activities during QC monitoring activities. The information in the QC log is intended to serve as a phone log and memory aide in the preparation of the Daily QC Report and in addressing follow-up questions that may arise. H&S staff input for the Daily QC Report is to be provided in writing to the CQC System Manager at a previously agreed upon time and place, generally no later than about 1 hour before normal close of business. For the sake of simplicity and completeness, the format for QC staff input should follow the same as for the Daily QC report with only the relevant sections completed.

Daily QC Reports and QC logs used on this project are accountable documents, subject to the restrictions specified in the Environment and Energy Group Quality Management Plan, Part I, Section 5. Each Daily QC Report is to be assigned and tracked by a unique number comprised of the Delivery Order number followed by the date expressed as DDMMYY. In the case of "no work day" reports, the report number is to comprise the Delivery Order, the last date covered, the number of days covered, and the initials "NW." For example, 0006-110496 is the report for this delivery order related to site work performed on 11 April 1996, and 0006-290596-3NW is the report for this delivery order related to three no work days from 27 May 1996 through 29 May 1996. Copies of Daily QC Reports with attachments and QC logs no longer in use are to be maintained in the project QC file. Upon project closeout, all QC logs are to be included in the project QC file.

## **6.0 CHEMICAL DATA QUALITY MANAGEMENT**

This section of the workplan addresses the chemical quality management aspects of this project and describes QC requirements for environmental sampling and analysis activities. The requirements and systems established herein are relevant and applicable to work performed by ICF KE and its subcontractors and suppliers. This chapter was developed based on the ICF KE Chemical Data Quality Management Plan (CQMP, CORP-QA-0005B); USACE ER 1110-1-263, Chemical Data Quality Management for Hazardous, Toxic, Radioactive Waste (HTRW) Remedial Activities, 1 April 1996; USACE EM 200-1-3, Requirements for the Preparation of Sampling and Analysis Plans, 1 September 1994; and New York State Department of Environmental Conservation (NYSDEC) Sampling Guidelines and Protocols, September 1992.

The objectives of this section are to document decisions made during the technical project planning/data quality objectives process and establish procedures to ensure that the environmental data quality meets contract and regulatory specifications. Specifically, this document:

- Defines project documentation and record keeping procedures for environmental sampling and analysis;
- Documents technical specifications for environmental sampling and analysis; and
- Establishes QC procedures, including the necessary supervision and tests to ensure that environmental sampling and analysis meet applicable specifications.

### **6.1 DATA QUALITY OBJECTIVES**

The Data Quality Objectives (DQOs) established for this project, based on the intended data uses, are summarized for each site in Sections 3.0 and 4.0.

### **6.2 SAMPLE HANDLING AND CUSTODY**

Collected samples are to be handled in a manner that ensures their integrity and traceability to the sampling location. This is to be achieved through use of trained field and laboratory personnel; controlled field, transport, and laboratory conditions; and implementation of rigorous sample preparation, filtration, containerization, preservation, storage, packaging, transportation, and custody procedures.

Detailed procedures for the collection of samples are provided in Sections 3.0 and 4.0. Collection of all samples will follow standard NYSDEC, USEPA and USACE protocols.

Sample handling protocols, including specifications for sample shipping, are described in Section 2.0. Sample label preparation and chain-of-custody record preparations and control are addressed in Section 2.0. Sample custody is to be maintained as prescribed in the ICF KE CQMP. Specifically, sample custody procedures are to ensure that the following objectives are met:

- Each sample is identified uniquely and correctly;
- Each sample is traceable to its source/point of origin;
- Sample representativeness is preserved;
- Sample alteration (e.g., preservation or filtration) is documented;

- A record of sample integrity is established and maintained throughout the custody process; and
- Sample custody is to be maintained and documented in the field, during shipment, and at the contract laboratory.

Field Custody includes sample collection, preservation, packaging, and delivery to shipping agent. Field custody procedures are to provide for generation and control of sample custody records. Custody records are to be generated in the field at the time of sample collection. A person is in custody of a sample if the sample is in that person's physical possession, in view after being in that person's physical possession, placed in a locked repository by that person, or placed in a secure restricted area by that person. The CQC System Manager is to verify that chain-of-custody forms are completed at the time of sample collection. Samples collected from a site are to be identified with a sample label and an entry on a chain-of-custody record. An example of the chain of custody form that will be used is provided in Appendix A.

Shipment Custody includes time spent under the control of and tracking by the carrier. To the extent practical, only carriers that provide tracking of each package are to be used. The name of the carrier is to be entered on the chain of custody form under "Received By" and "Relinquished By," but a signature is not required. The completed custody form is to be packaged in a plastic sealable bag within the sample cooler.

Contract Laboratory Custody is addressed below and in each Laboratory Quality Management Plan (LQMP). Each LQMP includes specific procedures for controlling sample receipt, logging, tracking, storage, holding, handling, preparation, digestion/extraction, analysis, and disposition. Receipt condition of sample containers and inconsistencies between chain-of-custody records and sample shipment are to be identified by the laboratory sample custodian, documented on the ICF KE Cooler Receipt Checklist, and brought to the attention of the CQC System Manager.

### **6.3 QUALITY CONTROL SAMPLES COLLECTED IN THE FIELD**

This section discusses the collection of quality control samples. Field operations performed will include the collection of several types of quality control samples. These samples will include duplicates, rinse blanks/equipment blanks, and trip blanks.

Duplicate samples will be taken from areas which are known or suspected to be contaminated and will consist of 5% of all field samples per matrix. Fractions for the same analytical parameters will always be collected consecutively. Volatile fractions for soil will not be homogenized before collection; however, they will be collected consecutively. The field duplicate samples will be sent to the contract laboratory separately identified. Duplicate samples will be used to assess sampling precision.

Rinse blanks will be collected when the sampling equipment is decontaminated and reused in the field or when a sample collection vessel (bailer or beaker) will be used. A consistent volume of rinse water (demonstrated analyte free: High Performance Liquid Chromatography (HPLC)-grade for organics, deionized for inorganics) will be poured over the equipment (i.e., rinsing the equipment) collecting the water in a sample container. The rinse blank determines whether the decontamination procedure has been adequately performed and that there is no cross-contamination of samples occurring due to the equipment itself. Analysis of rinse blanks will be for all analytes of interest. Rinse blanks will be collected at the rate of one per type of equipment per decontamination event, not to exceed one per day.

Trip blanks will be provided by the Contract Laboratory and will consist of HPLC-grade water sealed in 40 mL teflon-lined septum vials. The trip blank is used to determine if any on-site atmospheric contaminants are seeping into the sample vials, or if any cross-contamination of samples is occurring

during shipment or storage of sample containers. The trip blanks will accompany the aqueous samples for VOC analysis to the laboratory.

One organic free source water sample will be collected and analyzed prior to field activities. The source water will be analyzed for target analytes.

#### **6.4 FIELD DOCUMENTATION**

The requisite QC records for sampling and analysis activities are to be generated and controlled as prescribed in the ICF KE CQMP and specified below. Field documentation (i.e., QC records) for this project includes field logs, Chain-of-Custody Forms, sample labels, Collected Sample Reports, Daily QC Reports, borehole logging forms, field data sheets, and photographs.

##### **6.4.1 QC Record Control Procedures**

The Field Operations Leader is responsible for ensuring that the requisite QC records are generated and controlled. The CQC System Manager and his/her are to verify that these controls are implemented as follows:

- Measurements and observations are recorded at the time they are made;
- Documentation is orderly, legible, and traceable to relevant items/conditions;
- Documentation includes sufficient information to be readily interpreted by staff other than those responsible for its generation;
- Changes or revisions to a record are made in a manner that preserves the original data, such as by drawing a single line through a hard copy entry or maintaining historical records of electronic entries/files;
- Changes to records are signed (or initialed) and dated;
- As a minimum standard, changes to a record are subject to the same review and approval protocols as the original entry;
- Records adequately document digressions from specified procedures or work plan and identify authorization for the digression; and
- Project documents and records, including photographic and electronic records, are protected from loss, damage, misuse, or deterioration.

Photographs taken to document site conditions or otherwise support field activities are accountable documents/QC records and as such become part of the project files. When a photograph is taken, the date, time, subject, purpose of the photograph, exposure number, film/roll identification number, and name of person taking photograph are documented in the field logbook. When photographs are developed, the information in the field logbook is transferred to the back of the appropriate photograph.

##### **6.4.2 Sample Identification**

The following sample numbering designations will be used:

FT (site designation for Fort Totten)  
BM (site designation for Bellmore)

SS (surface soil)  
SB (soil boring)  
SC (composite from soil pile)  
SBC (composite from a single soil boring)  
MW (groundwater )  
GE (groundwater from geoprobe)  
DC (soil composite from drummed material)  
ESO (soil sample from excavation)  
LWC (liquid waste characterization sample)  
TB (trip blank)  
RB (rinse blank)

The following examples are provided for clarification:

FTSB01-1 represents the first (1) subsurface soil sample collected at FTSB01 (location code) at Fort Totten. Subsequent samples from this boring would follow as FTSB01-2, -3 etc.

BMMW01 represents the unique well identification ID for a well at Bellmore.

FTSBC01 represents a composite soil sample from multiple depth intervals from the same boring.

BMTB01 represents the first (01) trip blank sample from Bellmore.

#### **6.4.3 Field Records**

Bound logbooks shall be utilized for all recordkeeping purposes both in the field and laboratory. It is assumed that the use of the bound book will result in a chronological sequence of data insertion. Logbooks will contain a unique document control number. If corporate controlled logbooks are used, the document control number will be on all pages. Non-corporate controlled logbooks will be bound, and the document control number need only be contained on the document cover. Pages will be numbered, but numbered pages may be limited to pages with information.

To facilitate data validation, the person making an entry must sign and date the entry. All entries must be recorded in ink. Correction to entries shall be made by drawing a line through the incorrect entry, recording the correct information, and initialling and dating the corrected entry. If computerized information is utilized, a hard copy which has been permanently affixed to the logbook will be acceptable as an original record of sampling and laboratory logging.

Documents used or generated during the course of the project are accounted for and become a part of the project files upon completion of the task. These may include but are not limited to the following:

- a. Sample identification documents and field logbooks;
- b. Chain of custody records;
- c. Inventory of investigation-derived wastes;
- d. Project Deliverables (i.e., Test Plan, Operations Manual, design drawings and specifications, etc.);
- e. Analytical logbooks, laboratory data, calculations, graphs, control charts, field logs, boring logs (to include instrument ID numbers, calibration, and measurements), and software;
- f. Reports and correspondence material;

- g. Records of deviation from the QAPP or Technical Plan; and
- f. Photographs.

When an error is made on an accountable document, corrections are made by drawing a single line through the error and entering the correct information. The correction must also be initialed and dated. A brief explanation must be provided explaining the reason the correction was made. The marked copies of checked material shall be retained for future reference. Notes, calculations, and other information marked on documents assist in follow-up design and aid in re-checking portions of documents.

Logbooks for sampling and field investigation purposes must be bound, and entries recorded in waterproof ink. The logbook must contain information to distinguish samples from each other. The following information should be included for each sample collected:

- a. USACE project;
- b. Sequential field sample number;
- c. Matrix sampled;
- d. Sample depth;
- e. Sampling date and time;
- f. Specific sampling location;
- g. Method of sampling;
- h. Preservation techniques;
- i. Analytes of interest;
- j. Volume of water removed during well development;
- k. Sampling observations;
- l. Results of field measurements;
- m. Printed name and signature of samplers;
- n. Date of shipment;
- o. Number of shipping containers; and
- p. Samples sent and carrier;

## 6.5 FIELD QC

The designated CQC System Manager is to ensure that the 3-phase control process is implemented and for each definable feature of work, regardless of whether they are performed by ICF KE or subcontractors. This section identifies specific requirements related to 3-phase control for sampling and related features of work.

Preparatory Phase Inspection. This phase is designed to verify that the required plans and procedures have been prepared and approved and are available to the field staff; field equipment is appropriate for its intended use, available, functional, and properly calibrated; responsibilities have been assigned and communicated; field staff have the necessary knowledge, expertise, and information to perform their jobs; arrangements for support services (such as drillers, surveyors, and laboratories) have been made; and prerequisite site work has been completed

Initial Phase Inspection. At a minimum, the CQC System Manager is to oversee all removal actions and field measurement and sampling activities; inspect sample labels and custody documentation; oversee sample packaging and preparation for shipment; observe instrument calibration practices; and inspect field notes, data sheets, and other documentation.

## **6.6 CALIBRATION AND MAINTENANCE**

Field and laboratory measurement and test equipment (M&TE) are to be calibrated to the appropriate traceable standards. Records of these activities are to be generated by the individual performing the activity with copies provided to the CQC System Manager for retention in the project QC file.

## **6.7 ANALYTICAL PROCEDURES**

Project samples, whether analyzed in the field or at a contract laboratory, are to be prepared, digested, extracted, and analyzed per specifications of the Delivery Order and project data quality objectives. **Exhibit 6-1** identifies the specific methods that are to be used on this project. Each contract laboratory is to demonstrate achievement of the specified detection/quantitation limits and method performance criteria. Project samples are to be prepared, extracted, digested, and analyzed by the specific contract laboratory identified herein.

Specified methods are to be implemented as published. Modifications to approved procedures, alternate procedures, or additional procedures are to be pre-approved in writing by the COR and the USACE QA laboratory. If non-standard methods are considered, the contract laboratory shall provide method validation data for USACE consideration. Where deemed necessary to fulfill the requirements of the project, a request for COR approval for an alternate or modified method is to be made by the CQC System Manager (or his/her designee) using the USACE form published in USACE ER 200-1-1

## **6.8 LABORATORY QC**

Laboratory activities performed under contract to ICF KE shall meet applicable contractual and project requirements. This is to be ensured and verified by the CQC System Manager and his/her staff through implementation of the 3-phase control process for each definable feature of work performed by the contract laboratories. To the extent practical, initial and follow-up inspections for multiple features of work are to be scheduled during the same laboratory visit. The designated CQC System Manager is to ensure that the 3-phase control process is implemented.

**Preparatory Phase Inspection.** Prior to the submittal of project samples to the laboratory, the CQC System Manager is to verify that technical requirements have been planned and work pre-requisites have been identified and met. At a minimum, the CQC System Manager is to verify that the requisite MRD validations have been achieved; the LQMP has been reviewed and accepted by ICF KE and the COR; laboratory equipment is of appropriate type, sensitivity, and quantity for its intended use; facilities are appropriate for the expected sample load; responsibilities are assigned and communicated; laboratory staff are qualified to perform their jobs; subcontracting restrictions have not been violated; and approved procedures and controls are in place.

**Initial Phase Inspection.** During the first day of each analytical definable feature of work, the CQC System Manager and Contract Laboratory QC Manager are to perform an on-site inspection at the laboratory. They are to jointly monitor the work being done and verify compliance with the specifications and requirements of the contract, Delivery Order, and approved project plans and procedures. The CQC System Manager and Contract Laboratory QC Manager are responsible for ensuring that discrepancies between laboratory practices and approved specifications are identified and resolved. At a minimum, the CQC System Manager is to observe sample tracking, handling, preparation, extraction, and analysis; observe instrument calibration practices; verify that subcontracting restrictions have not been violated; and inspect project-related documentation. Initial inspection results are to be documented by the CQC System Manager in a report that is attached to the Daily QC Report.

Follow-up Phase Inspection. During each day of project activities, the Contract Laboratory QC Manager is responsible for monitoring the practices and operations taking place and verifying continued compliance with the specifications and requirements of the contract, Delivery Order, and approved project plans and procedures. The Contract Laboratory QC Manager is to document his/her follow-up activities in a report that is attached to the Daily QC Report.

#### **6.8.1 Method/Sample QC**

Method QC includes the analyses and activities required to ensure that the analytical system is in control prior to and during an analytical run. Method QC requirements for this project are specified within each method referenced in this workplan.

Sample QC includes the analyses and activities required to ensure that the analytical system is in control during the analysis of a specific sample. The contract laboratory will be required to meet the criteria specified by the analytical method.

### **6.9 DATA QUALITY INDICATORS**

The purpose of this section is to define QA goals for precision, accuracy, sensitivity, completeness, representativeness and comparability and provide the means to quantitatively and qualitatively evaluate the data quality.

#### **6.9.1 Precision**

Precision refers to the level of agreement among repeated measurements of the same parameter. It is usually stated in terms of standard deviation, relative standard deviation, relative percent difference, range, or relative range. The overall precision of data is a mixture of sampling and analytical factors. The goals for each factor are addressed below.

For chemical data collected for use in a risk assessment, sampling precision will be checked by obtaining one duplicate sample for every 20 samples collected for each type of media (5%). Precision will be evaluated by calculating the relative percent difference (RPD) as follows:

$$XA > XB$$

XA and XB are duplicate analyses, and  
XM is the mean value of duplicate analysis XA and XB

The RPD will be calculated for each analytical parameter. It is expected that the duplicates for aqueous matrices will have a RPD less than 50% and solid matrices will have a RPD less than 50%. If these criteria are not met, a careful examination of the sampling techniques, sample media, and analytical procedure will be conducted to identify the cause of the high RPD and the usefulness of the data. The data will be qualified and the location may be re-sampled and reanalyzed based on the decision of the USAEC project officer.

Analytical precision will be addressed by analysis of matrix spike duplicates by the Contract Laboratory. Two spike standard matrix QC samples will contain all target analytes at a concentration near the upper limit of the certified range or approximately 10 X CRL. Control limits will be determined upon certification. Control charts will be maintained to track laboratory performance.

The RPD for each analytical parameter will be calculated and compared to the criteria. If these criteria are not met, an examination of the data similar to that described above will be conducted to determine the cause of the variability and usefulness of the data. The data may either be qualified or the location re-sampled and reanalyzed based on the decision of the project officer.

### **6.9.2 Accuracy**

Accuracy is the degree of agreement of a measurement (or an average of measurements of the same thing), X, with an accepted reference or true value, T, usually expressed as the difference between the two values, X-T, or the difference as a percentage of the reference or true value,  $100 (X-T)/T$ , and sometimes expressed as a ratio, X/T. Accuracy is a measure of bias in a system.

For chemical data collected for use in a risk assessment, accuracy will be checked quantitatively through the use of matrix and surrogate spikes, and blanks controlled by the laboratory. The accuracy is calculated based on the percent recovery of the spikes and will be reviewed through the validation of weekly control charts.

Accuracy of field measurements will be qualitatively controlled through the use of SOPs which have been developed to standardize the collection of measurements and samples. Consistent proper calibration required of all equipment throughout the field exercises will assist in the accuracy of measurements.

### **6.9.3 Sensitivity**

Sensitivity is to be expressed in terms of detection and quantitation limits for each type of measurement/analysis. Detection/quantitation limits should be compared to the levels proposed within the applicable methods to verify that they are attainable with the specified methodology and instrumentation.

### **6.9.4 Completeness**

Completeness is to be expressed and calculated as the percentage of measurements that are judged to be valid. Also, critical samples should be identified and appropriate controls maintained to ensure that valid data are obtained in order to obtain the requisite type, quantity, and quality of data. Completeness is generally calculated for each type of measurement/analysis as follows:

$$\% C = V/N * 100\%$$

Where: V = number of measurements judged valid  
N = number of planned measurements

### **6.9.5 Representativeness**

Representativeness expresses the degree to which sample data represent the characteristics of a population of samples, parameter variations at a sampling point, or an environmental condition. Representativeness is to be ensured in the field through implementation of appropriate sample collection, preservation, handling, techniques. In the laboratory, representativeness is to be ensured by appropriate subsampling or aliquoting techniques. Representativeness is to be assessed through results of duplicate field and laboratory samples.

### **6.9.6 Comparability**

Comparability is a qualitative parameter expressing the confidence with which one data set can be compared with another. Comparability is to be assessed between contract laboratory data and USACE QA laboratory data, between existing or historical data and project data. In each case, comparability is to be ensured through use of standard sampling and analysis methodology and comparable operating conditions. Consideration is to be given to variations such as seasonal trends, depth of sample collection, and stream flow. To facilitate comparison of data sets, appropriate reporting units are to be specified and used.

## **6.10 DATA REDUCTION, ASSESSMENT, MANAGEMENT AND REPORTING**

### **6.10.1 Data Reduction**

The conversion of raw data into reported results is to be performed as detailed in the analytical methods. Field SOPs and laboratory SOPs include automated or manual data reduction procedures, equations, conversion factors, significant figures, and reporting units.

Outlier data may occur at any phase of the data collection process. Outliers may occur as a consequence of an out-of-control system or through natural random variance. Once identified, outlier data are to be characterized with respect to the cause, nature, and degree of exceedances. Available information relevant to the measurement process that produced the suspect data are to be reviewed for calculation and transcription errors, clear indications of instrument malfunction, and verification that the measurement corresponds to the intended sample or measurement location.

Calculation, transcription, and sample/measurement identification errors are to be corrected and the resulting data are to be re-evaluated, as appropriate. Data generated using faulty instruments are to be evaluated by the Project Chemist for usability, based on the extent and severity of the malfunction and the critical nature of the data. Corrective action measures are to be taken to resolve problems and restore proper function to the analytical system when data indicate that the analytical system is not performing adequately. Corrective action measures are to be initiated, documented, tracked and verified. These measures may be necessary when the following occurs:

- QC data are not within the control limits for precision and accuracy
- Blanks contain contaminants above the specified levels
- Calibration data or instrument performance parameters are not within acceptance criteria
- Undesirable trends are observed in the QC data or calibration data
- There are unusual changes in instrument sensitivity or performance
- Deficiencies are detected during inspections, audits or from the results of PE samples

Laboratory corrective actions are to be implemented by the laboratory QA manager in consultation with the CQC System Manager. Corrective actions may include, but are not limited to the following:

- Re-analysis of the samples
- Documentation of interferences or matrix effects that result in poor analytical performance
- Evaluating and changing sampling or analytical procedures
- Re-sampling and re-analysis, if the completeness or usability of the data set does not meet the criteria for acceptability.

If there is no indication of error in the measurement and unless otherwise directed by the COR or specified in the method, ASTM method E178-94, Standard Practice for Dealing with Outlying Observations is to be used to establish a rationale for treating outlying data.

### **6.10.2 Data Quality Assessment**

Data quality is to be assessed prior to use to judge usability and determine if project objectives were met. Data quality assessment includes data review, validation, and usability assessment.

Data Review (which is independent of the intended use of the data) determines the technical merit of the data by comparing the QC results to method-specified criteria. Field crews are to review their data and implement any necessary corrective actions prior to submitting the data for use. Prior to submitting data to ICF KE, each contract laboratory is responsible for reviewing their data; implementing corrective actions where possible; and reporting nonconformances and the corresponding corrective actions, as applicable. Laboratory data are to be reviewed as prescribed in the contract laboratory's approved LQMP. This review is to meet the procedural and documentation requirements for technical data review, as prescribed in EM 200-1-3, Section B-11(b).

Data Validation (an independent verification of the quality and integrity of the data) includes a review of data traceability, documentation, calculations, check for transcription errors, and an evaluation of the data deliverables for contract compliance. During the validation, QC results are to be compared to procurement specifications and project DQOs. In accordance with direction provided during the coordination meeting, 10 percent of the data are to be validated, with the remaining data validation performed only if warranted based on the initial validation. Validation protocols to be used are EPA Region II. Information on contract laboratory performance on routine analyses is to be captured and entered into the ICF KE Data Validation Results Tracking System. The tracking system is described in Section 2.8 of the ICF KE CQMP.

Data Usability includes a review of the quantity, type, and overall quality of the data to determine their suitability for specified purposes. EPA guidance for data usability (e.g., OERR 9285.7-09) are to be followed to the extent practical.

#### **6.10.3 Data Management**

Field data collected during sampling will be filed in the ICF KE document control system file. Electronic files containing laboratory generated data will be available if requested. Data will be validated according to USEPA Region II protocols. Data entries are to be checked by the CQC System Manager or his/her designee to verify accuracy and integrity. The field and laboratory data will also be checked by the CQC System Manager or his/her designee to determine if it makes sense from an historical perspective, is representative, and agrees with previous data collected or literature reported values. Project data are not to be released for use until QC checks have been performed and discrepancies resolved.

#### **6.10.4 Data Reporting**

Submittals from each contract laboratory are to be logged in the Submittal Register by the CQC System Manager or his/her designee and routed through data validation to the data users or Project Manager. Final data submittals are to be provided to USACE and are to include data qualifiers from the validation process.

### **6.11 INTERNAL PERFORMANCE AND SYSTEM AUDITS**

Field and contract laboratory audits may be scheduled and performed at the direction of the COR and as needed to supplement three-phase inspection activities and laboratory validation process. Audits are to be performed and documented as prescribed in the ICF KE QC Program for USACE Contracts.

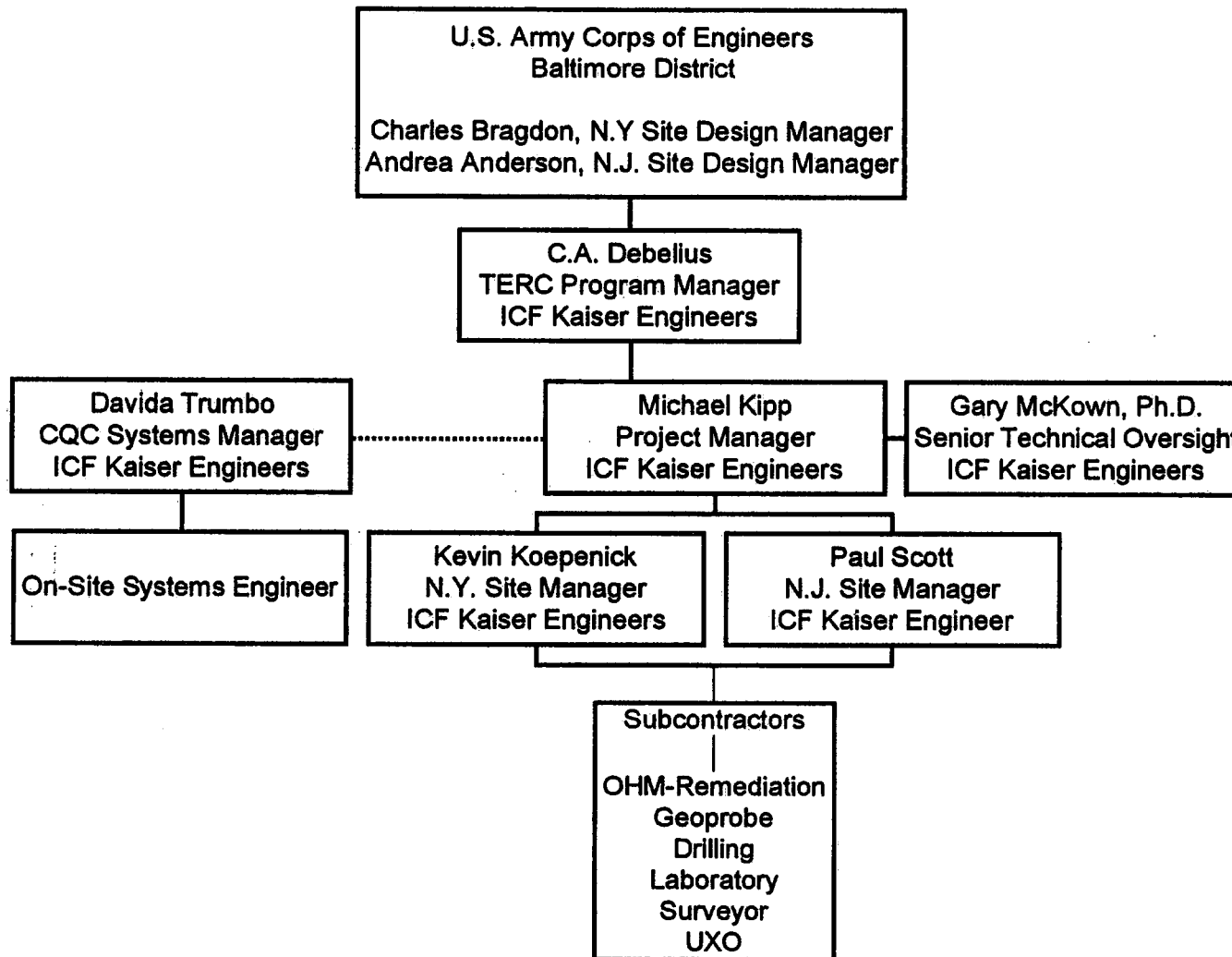
## **7.0     SCHEDULE**

The Delivery Order Schedule (**Exhibit 7-1**) developed for this delivery order indicates the planned activities, the sequence of activities and duration of each for every month of the task. Adjustments to this schedule will be made only following consultation with the USACE Baltimore District Design Managers.

## **8.0     REFERENCES**

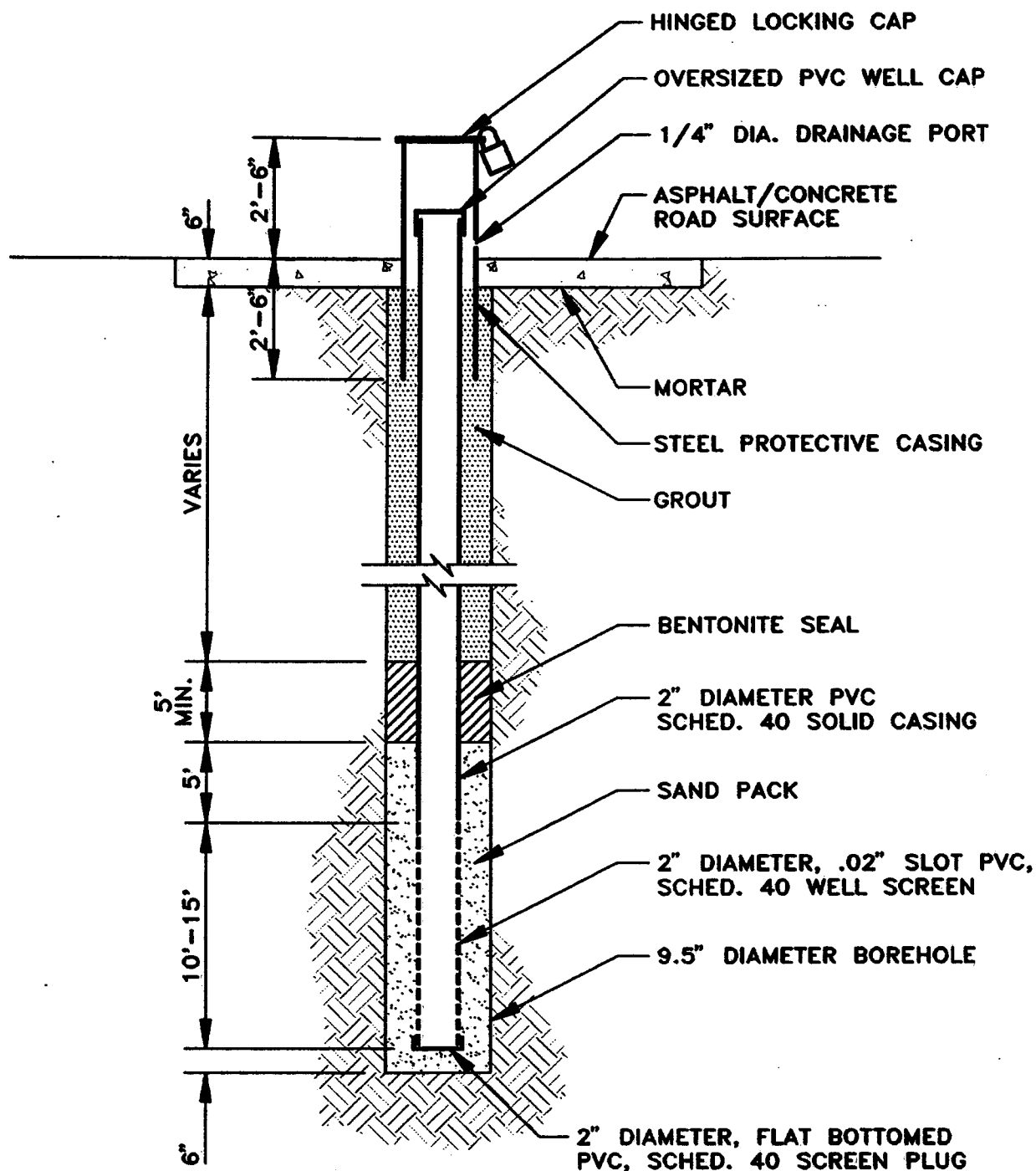
- U.S Army Corps of Engineers. 1995 Preliminary Environmental Site Investigation At Bellmore USARC Maintenance Facility, Bellmore New York. Prepared by Staunton Chow Engineers.
- Hill Environmental, Inc. 1995 Interim Report Site Investigation For Groundwater Contamination At Fort Totten, New York.
- Hill Environmental, Inc. 1995 Site Investigation For Soil Contamination At Fort Totten and Fort Hamilton, New York.
- New York State Department of Environmental Conservation. 1992 Sampling Guidelines and Protocols. Technological Background and Quality Control Quality Assurance for NYSDEC Spill Response Program.
- New York State Department of Environmental Conservation. 1992 STARS Memo #1 Petroleum-Contaminated Soil Guidance Policy.
- New York State Department of Environmental Conservation. 1994 SPOTS Memo # 14 Site Assessment at Bulk Storage Facilities.
- New York State Department of Environmental Conservation. 1994 Division Technical and Administrative Guidance Memorandum: Determination of Soil Cleanup Objectives and Cleanup levels.
- New York State Department of Environmental Conservation. 1993 Division of Water Technical and Operational Guidance Series (1.1.1) Ambient Water Quality Standards and Guidance Values.
- U.S. Army Corps of Engineers. 1992 CEGS-02071, Guide Specification for Military Construction, Section 02071 Underground Storage Tank Removal
- New York State Department of Environmental Conservation. Guidelines for Exploratory Boring, Monitoring Wells Installation, and Documentation of these Activities.
- ICF Kaiser Engineers, Inc, 1995 ICF Kaiser Quality Control Program for USACE Contracts.

**Exhibit 1-1  
Organization Chart  
for Fort Dix BRAC 1995 Project  
Delivery Order No. 6**



**EXHIBIT 1-2  
KEY INDIVIDUALS FOR DELIVERY ORDER 6  
NEW YORK SITES**

NAME	TITLE	ADDRESS	PHONE NUMBER
Peter Koutroublis	Fort Hamilton Environmental Office Representative	Fort Hamilton Army Base DPW Building 129 Attn: Afzt-FHE-V Brooklyn, New York 11252-6800	718-630-4485 Fax 718-630-4485
Charles Bragdon	USACE Design Manager, NY Sites	Attn: CENAB-EN-HM P.O. Box 1715 Baltimore, MD 21203-1715	410 962-0139 Fax 410 962-6732
To be designated	USACE New York District	To Be Provided	To Be Provided
<b>ICF KAISER ENGINEERS</b>			
Chuck Debelius	ICF KE TERC Program Manager	9300 Lee Highway Fairfax, VA 22031-1207	(703) 934-3130 Fax 703 218-2690
Gary McKown	ICF KE Senior Technical Oversight	1301 Continental Dr. Ste. 101 Abingdon, MD 21000-2335	(410) 612-6358 Fax 410 612-6351
Mike Kipp	ICF KE Project Manager	1301 Continental Dr. Ste. 101 Abingdon, MD 21000-2335	(410) 612-6380 Fax 410 612-6351
Davida Trumbo	ICF KE CQC Systems Manager	9300 Lee Highway Fairfax, VA 22031-1207	(703) 934-3027 Fax 703 218-2690
Kevin Koepenick	ICF KE New York Site Manager	1301 Continental Dr. Ste. 101 Abingdon, MD 21000-2335	(410) 612-6353 Fax 410 612-6351
<b>SUBCONTRACTORS</b>			
John Coffey	OHM Remediation Services Corp. (Removals, Paint abatement, PCB Surveys)	200 Horizon Center Blvd Trenton NJ 08691-1904	(609) 443-2870 Fax (609) 443-4091
	Drilling To Be Determined		
	Laboratory To Be Determined		
	Geoprobe To Be Determined		
	Surveyor To be Determined		
	UXO To Be Determined		



NOT TO SCALE



U.S. ARMY ENGINEER DISTRICT  
US Army Corps of Engineers  
NEW YORK, NY



ICF KAISER 1301 CONTINENTAL DR.  
SUITE 101  
ABINGDON, MD 21009

REVISION NO.:

DATE:

07/31/96

ACAD FILE:

F-TOTMW1

## TYPICAL MONITORING WELL CONSTRUCTION

TASK NO.:

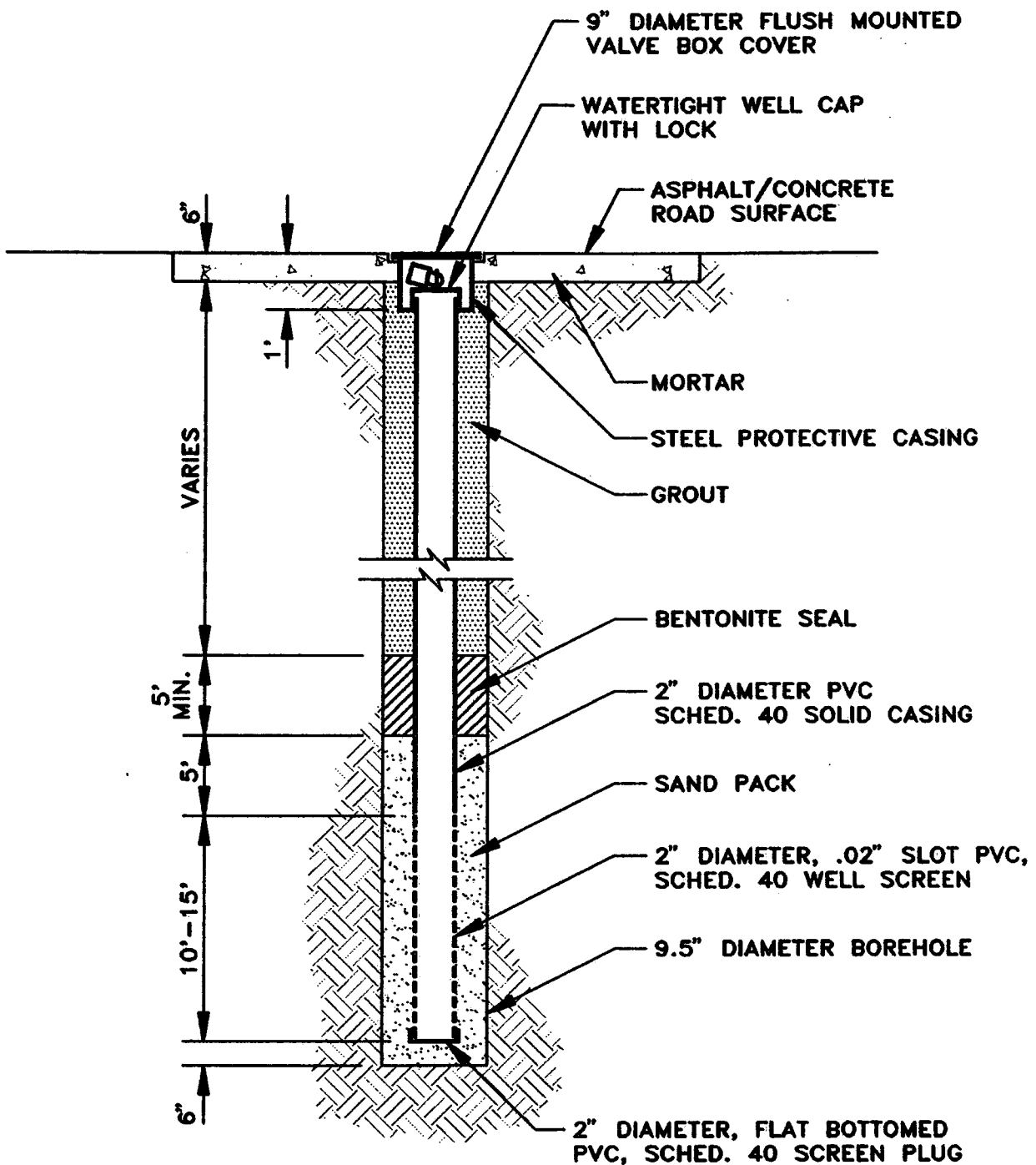
66706

SITE:

FORT TOTTON,  
BELLMORE USARC

FIGURE NO.:

2-1



NOT TO SCALE



U.S. ARMY ENGINEER DISTRICT  
**US Army Corps of Engineers**  
 NEW YORK, NY



**ICF KAISER** 1301 CONTINENTAL DR.  
 SUITE 101  
 ABINGDON, MD 21009

REVISION NO.:

DATE:

07/31/96

ACAD FILE:

F-TOTMW3

**TYPICAL FLUSH MOUNT  
 MONITORING WELL CONSTRUCTION**

TASK NO.:

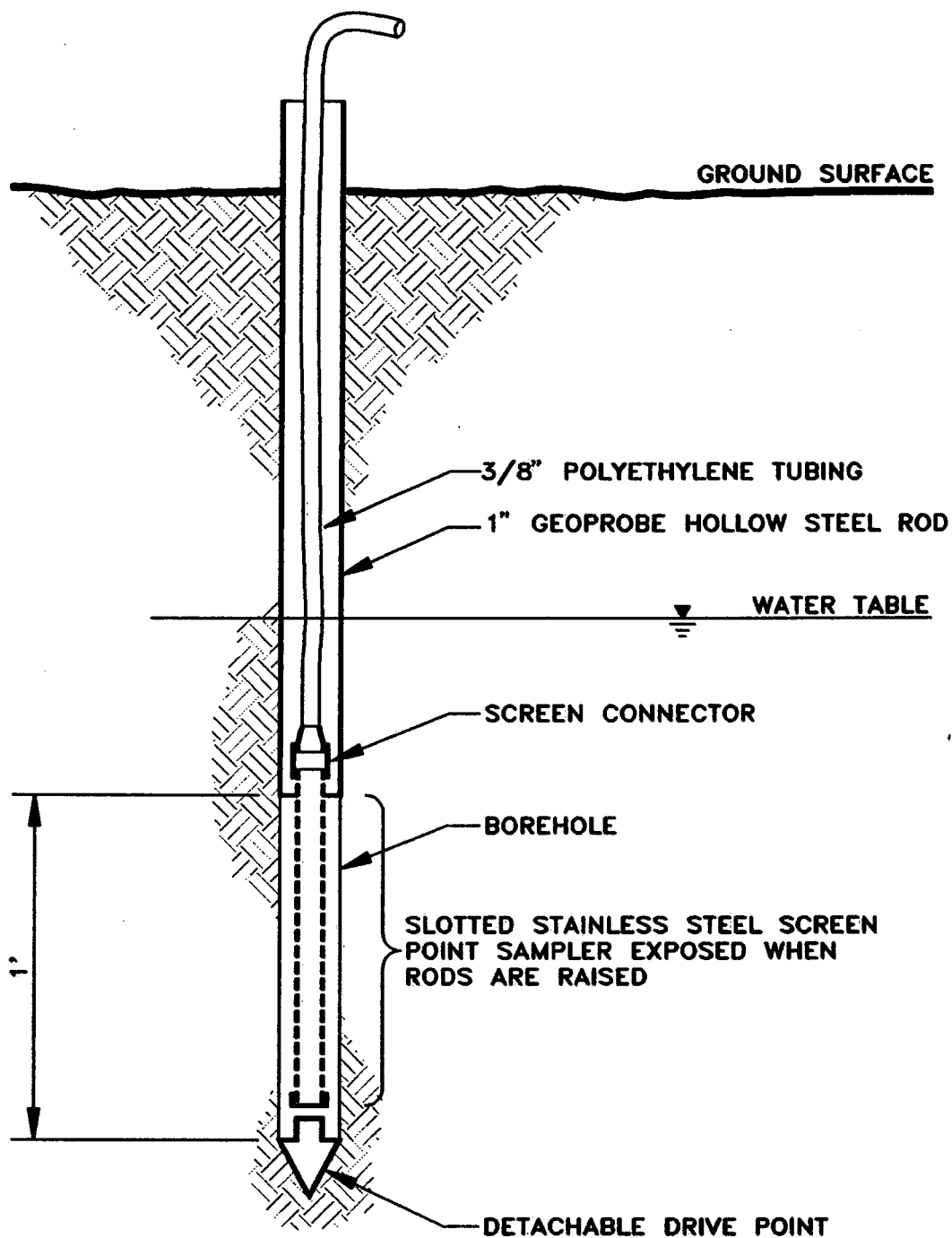
66706

SITE:

FORT TOTTEN,  
 BELLMORE USARC

FIGURE NO.:

**2-2**



NOT TO SCALE



U.S. ARMY ENGINEER DISTRICT  
**US Army Corps of Engineers**  
NEW YORK, NY



**ICF KAISER** 1301 CONTINENTAL DR.  
SUITE 101  
ABINGDON, MD 21009

REVISION NO.:

DATE:

07/31/96

ACAD FILE:

F-TOTMW2

**GEOPROBE SCREENING POINT  
GROUNDWATER SAMPLER**

TASK NO.:

66706

SITE:

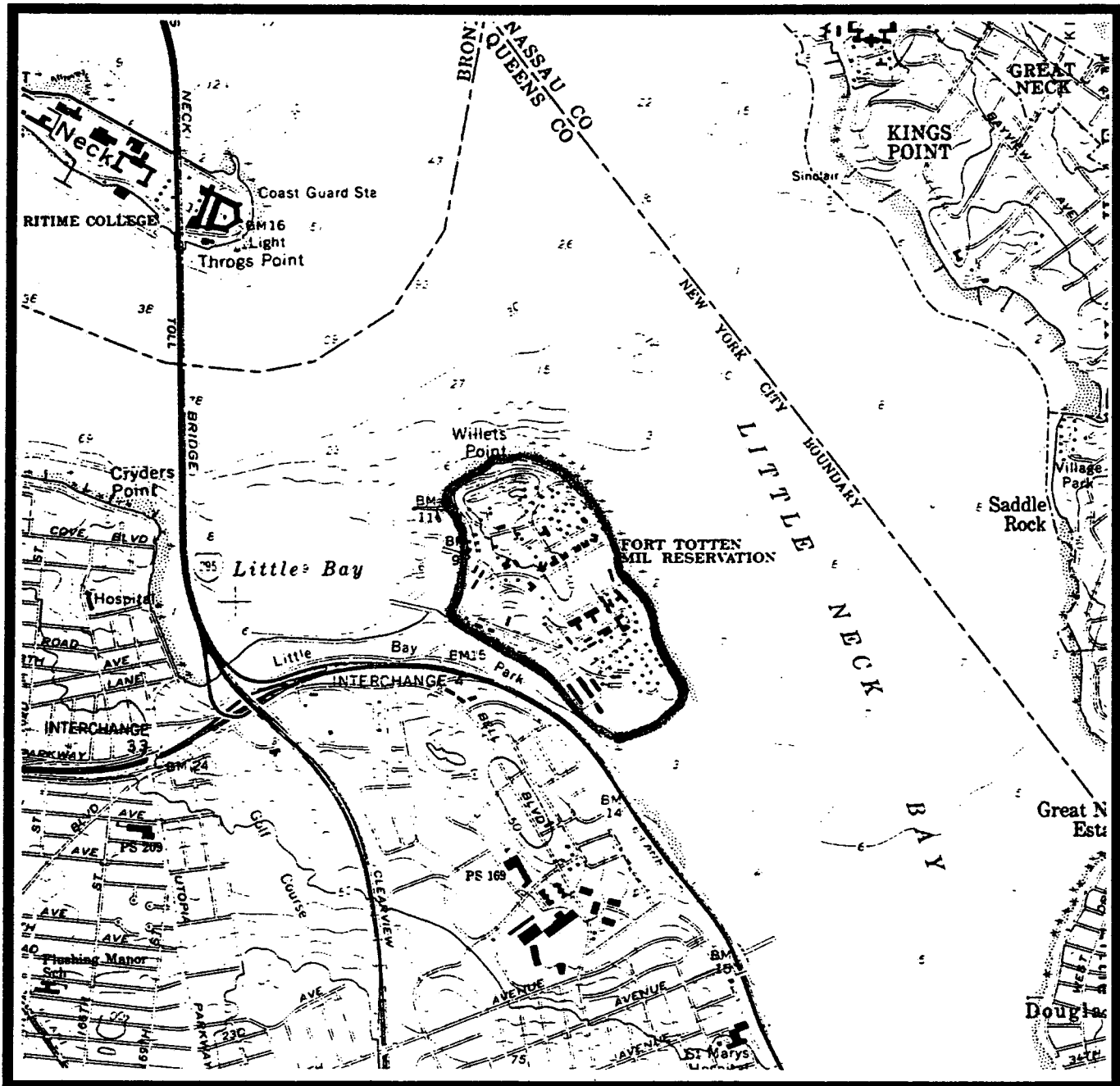
FORT TOTTEN,  
BELLMORE USARC

FIGURE NO.:

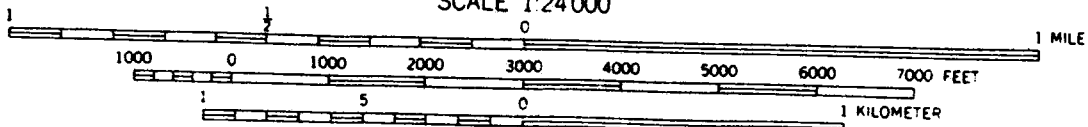
**2-3**

# EXHIBIT 3-1

## VICINITY MAP OF FORT TOTTEN (From USGS 7.5' Minute, Flushing Quadrangle)



SCALE 1:24 000



**EXHIBIT 3-2**

**SOIL/SEDIMENT SAMPLING PROGRAM AT FORT TOTTEN**

General Location of Soil/Sediment Samples	Proposed Number of Sample/Boring Locations	Proposed Sampling Depths (ft)	Sampling Method	Number of Samples for Chemical Analysis	Analyses
<b>Soil</b>					
Old Garage Area	1 boring	0-2 10-12 15-17	Split Spoon (HSA)	1 (composite)	TCLP (Pb)
Building 107	10 surface soils	0-2	Hand Auger	10	TCL VOCs, SVOCs, pesticides/PCBs, TAL inorganics + cyanide
	4 borings	1-3, 5-7, 10-12	Split Spoon (HSA)	12	TCL VOCs, SVOCs, pesticides/PCBs, TAL inorganics + cyanide (TCLP (Hg,Cr) on hold) <sup>1</sup>
Building 602 (Former 2,000-gallon Gasoline UST)	15 geoprobe borings	3-5 8-10 13-15	geoprobe (macro-core)	5 Samples from the 15 borings will be selected for analysis based on PID screening	USEPA 8021, 8270
Parade Grounds (BRAC Parcel 60)	1 geoprobe boring	3-5 8-10 13-15	geoprobe (macro-core)	1 (composite)	USEPA 8021, 8270
Building 336 (BRAC Parcel 77)	2 surface soils	0-2	hand auger	2	TCL VOCs, SVOCs, pesticides/PCBs, TAL inorganics + cyanide
Old Fort (BRAC Parcel 78)	2 geoprobe borings	3-5 8-10 13-15	geoprobe (macro-core)	2 (composites)	TCL VOCs, SVOCs, pesticides/PCBs, TAL inorganics + cyanide
Old Fort (BRAC Parcel 61)	1 geoprobe boring	3-5 8-10 13-15	geoprobe (macro-core)	1 (composites)	TCL VOCs, SVOCs, pesticides/PCBs, TAL inorganics + cyanide

**EXHIBIT 3-2 (Continued)**

**SOIL/SEDIMENT SAMPLING PROGRAM AT FORT TOTTEN**

General Location of Soil/Sediment Samples	Proposed Number of Sample/Boring Locations	Proposed Sampling Depths (ft)	Sampling Method	Number of Samples for Chemical Analysis	Analyses
<b>Sediment</b>					
Little Bay Shoreline	14 (8 along BRAC Parcel 79; 6 along BRAC Parcel 62)	0-1	Hand Auger	14	Mercury

**Legend:**

TCLP: Toxicity Characteristic Leaching Procedure  
 TAL Inorganics: USEPA Target Analyte List for Inorganics  
 TCL VOCs: USEPA Target Compound List of volatile organic compounds  
 TCL SVOCs: USEPA Target Compound List of semi-volatile organic compounds  
 PCBs: polychlorinated biphenols

1

A sufficient quantity of soil will be collected and sent to the laboratory on hold for possible TCLP (Pb, Cr) analysis.

**EXHIBIT 3-3**

**GROUNDWATER SAMPLING PROGRAM AT FORT TOTTEN**

Location	Number of Wells/Geoprobe Points	Approximate Depth of Well (ft)	Screened Interval (ft)	Approximate Depth to Water Table (ft)	Proposed Drilling Method	Analysis for Groundwater Samples
<b>Monitoring Wells</b>						
Former Landfill (BRAC Parcel 74)	2	25	15 (spanning the water table)	15	Hollow Stem Auger	TCL VOCs, SVOCs, pesticides/PCBs, TAL inorganics + cyanide
Buildings 601, 604	1	25	15 (spanning the water table)	15	Hollow Stem Auger	TCL VOCs, SVOCs, pesticides/PCBs, TAL inorganics + cyanide
Buildings 109 -113	2	25	15 (spanning the water table)	15	Hollow Stem Auger	TCL VOCs, SVOCs, pesticides/PCBs, TAL inorganics + cyanide
Building 102	1	25	15 (spanning the water table)	15	Hollow Stem Auger	TCL VOCs, SVOCs, pesticides/PCBs, TAL inorganics + cyanide
Buildings 107, 108	2	25	15 (spanning the water table)	15	Hollow Stem Auger	TCL VOCs, SVOCs, pesticides/PCBs, TAL inorganics + cyanide
Upgradient Well in Geographic Area E	1	25	15 (spanning the water table)	15	Hollow Stem Auger	TCL VOCs, SVOCs, pesticides/PCBs, TAL inorganics + cyanide

**EXHIBIT 3-3 (Continued)**

**GROUNDWATER SAMPLING PROGRAM AT FORT TOTTEN**

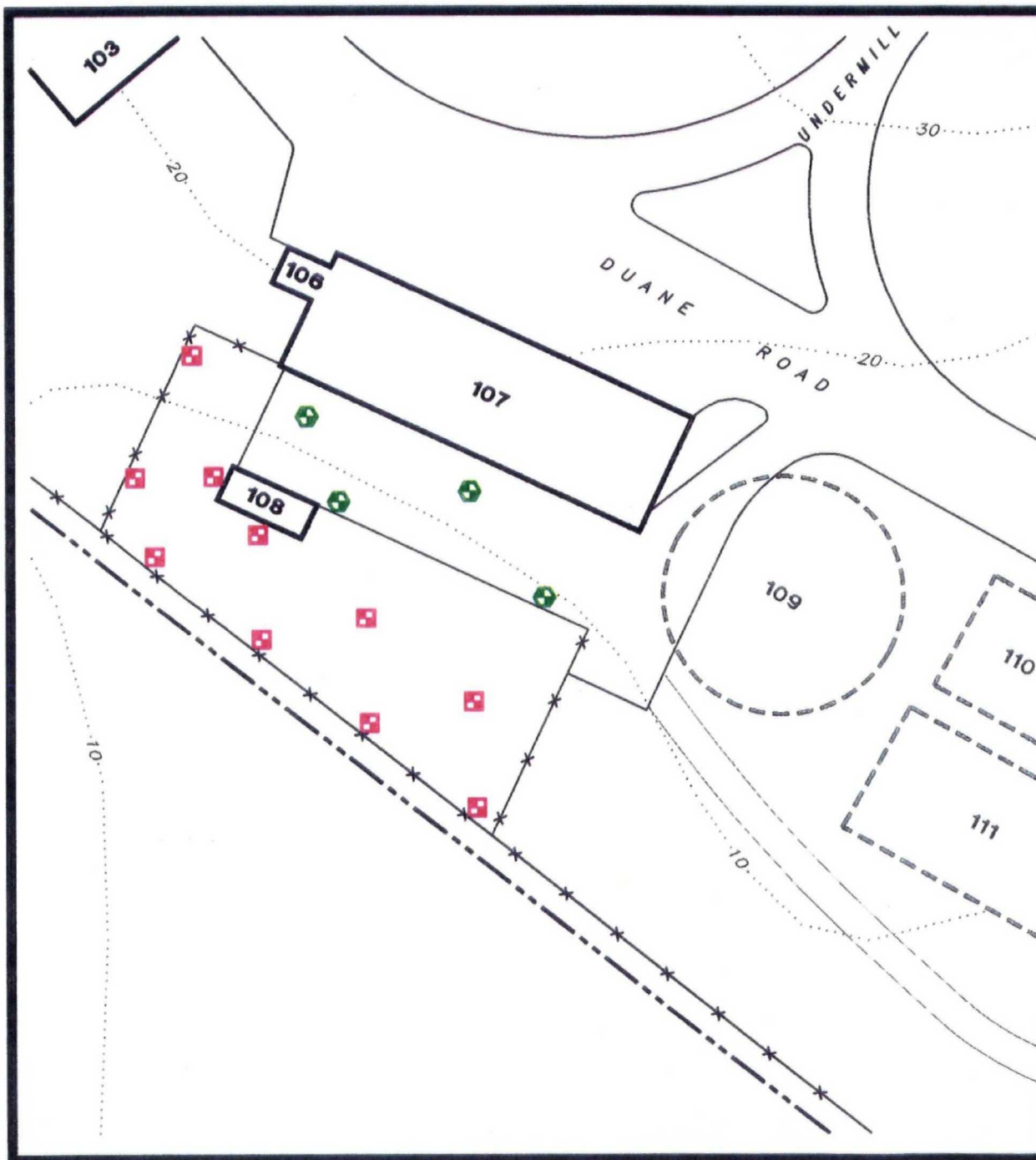
Location	Number of Wells/Geoprobe Points	Approximate Depth of Well (ft)	Screened Interval (ft)	Approximate Depth to Water Table (ft)	Proposed Drilling Method	Analysis for Groundwater Samples
<b>Geoprobe Points</b>						
Old Fort (BRAC Parcel 61)	1	20	2	15	geoprobe	TCL VOCs, SVOCs, pesticides/PCBs, TAL inorganics + cyanide
Old Fort (BRAC Parcel 78)	2	20	2	15	geoprobe	TCL VOCs, SVOCs, pesticides/PCBs, TAL inorganics + cyanide
BRAC Parcel 59	1	20	2	15	geoprobe	TCL VOCs, SVOCs, pesticides/PCBs, TAL inorganics + cyanide

**Legend:**

TAL inorganics: USEPA Target Analyte List for inorganics  
 TCL VOCs: USEPA Target Compound List of volatile organic compounds  
 TCL SVOCs: USEPA Target Compound List of semi-volatile organic compounds  
 PCBs: polychlorinated biphenols

**NOTE:** A total of six groundwater sampling rounds (every 3 months) will be conducted on the proposed monitoring wells. The proposed analytical suite may be revised following review of the second round of sampling results.





# **LEGEND:**

--- PROPERTY BOUNDARY

\*-\*-\* FENCE

... TOPOGRAPHIC CONTOUR



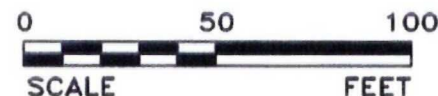
FORMER BUILDING LOCATION



PROPOSED SOIL BORING LOCATION



PROPOSED SURFACE SOIL SAMPLING LOCATION



U.S. ARMY ENGINEER DISTRICT  
**US Army Corps of Engineers**  
NEW YORK, NY

**ICF KAISER**

1301 CONTINENTAL DR.  
SUITE 101  
ABINGDON, MD 21009

REVISION NO.:

DATE:

08/01/96

ACAD FILE:

B107-SMP

**PROPOSED LOCATIONS OF SOIL SAMPLING LOCATIONS IN THE VICINITY OF BUILDING 107**

TASK NO.:

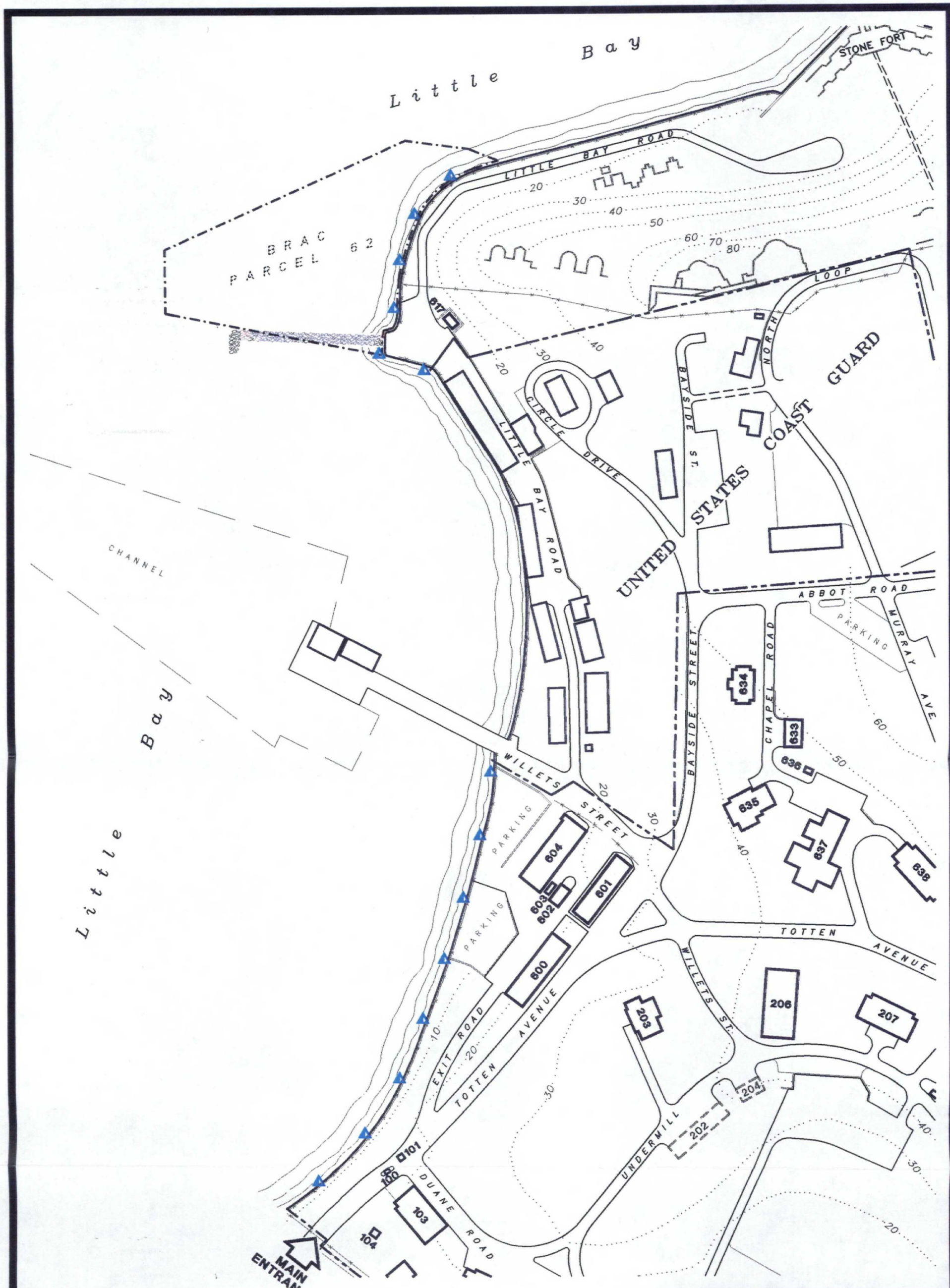
66706

SITE:

FORT TOTTEN  
BAYSIDE, NY

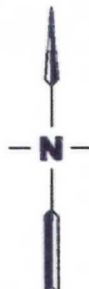
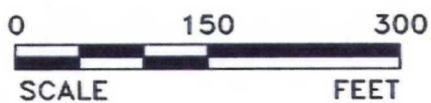
EXHIBIT NO.:

**3-5**

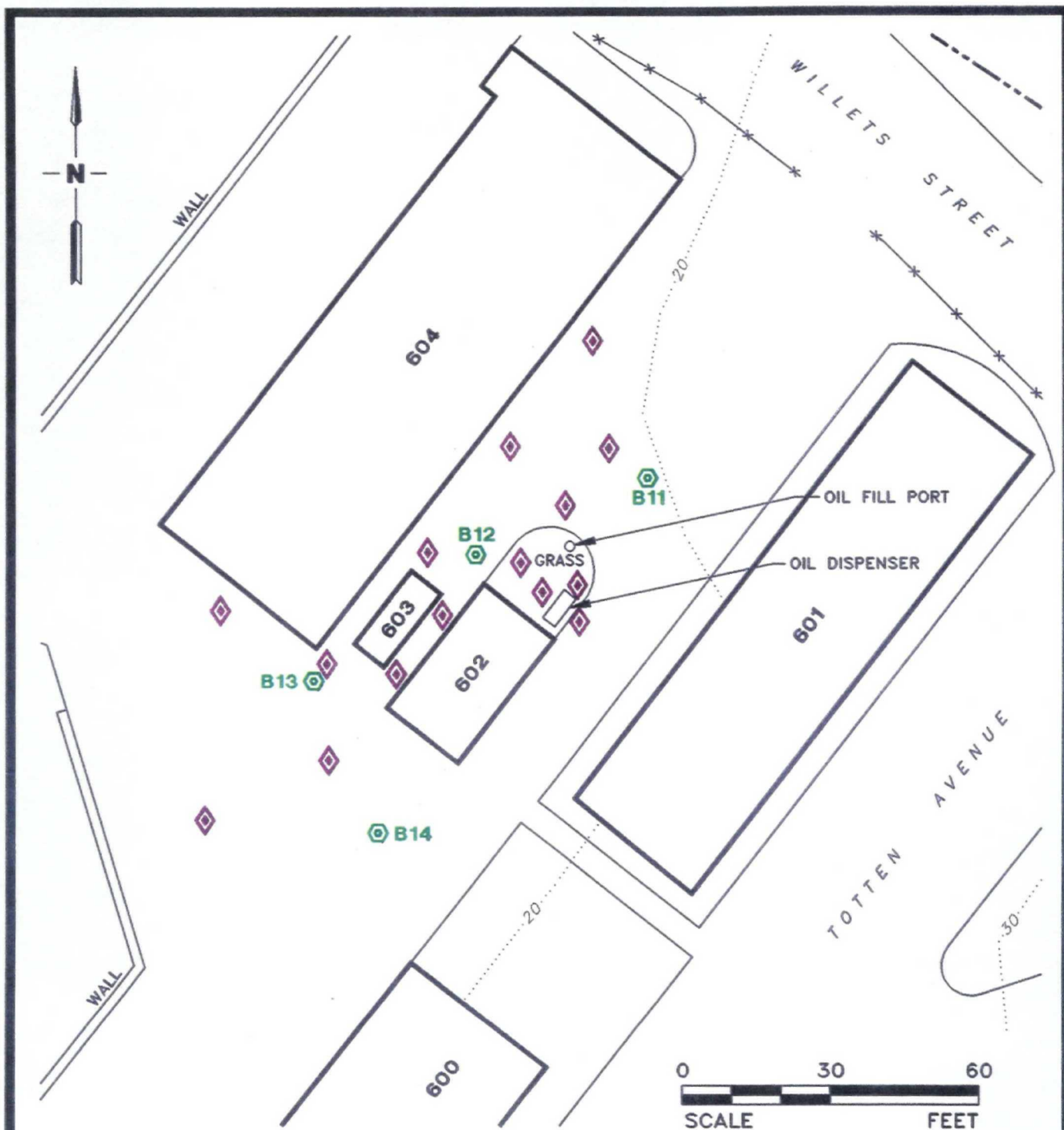


**LEGEND:**

- — — — — PROPERTY BOUNDARY
- x — x — x — FENCE
- ..... TOPOGRAPHIC CONTOUR
- [ ] FORMER BUILDING LOCATION
- ▲ PROPOSED SEDIMENT SAMPLE LOCATION



<b>U.S. Army Corps of Engineers</b> NEW YORK, NY		
<b>ICF KAISER</b>		
1301 CONTINENTAL DR. SUITE 101 ABINGDON, MD 21009		
REVISION NO.:	DATE:	ACAD FILE:
	08/01/96	SHOR-SMP
<b>PROPOSED LOCATIONS OF          SEDIMENT SAMPLES ALONG          THE LITTLE BAY SHORELINE</b>		
TASK NO.:	SITE:	EXHIBIT NO.:
66706	FORT TOTTEN BAYSIDE, NY	<b>3-6</b>



**LEGEND:**

- PROPERTY BOUNDARY
- \*-\*-\* FENCE
- 20--- TOPOGRAPHIC CONTOUR
- ⊗ LOCATION OF PREVIOUS SOIL BORING
- ◇ PROPOSED GEOPROBE SOIL SAMPLING LOCATION



U.S. ARMY ENGINEER DISTRICT  
**US Army Corps of Engineers**  
 NEW YORK, NY



**ICF KAISER** 1301 CONTINENTAL DR.  
 SUITE 101  
 ABINGDON, MD 21009

REVISION NO.:

DATE:

07/31/96

ACAD FILE:

B602-SMP

**REMEDIAL INVESTIGATION OF  
 HYDROCARBON CONTAMINATION  
 IN THE VICINITY OF BUILDING 602**

TASK NO.:

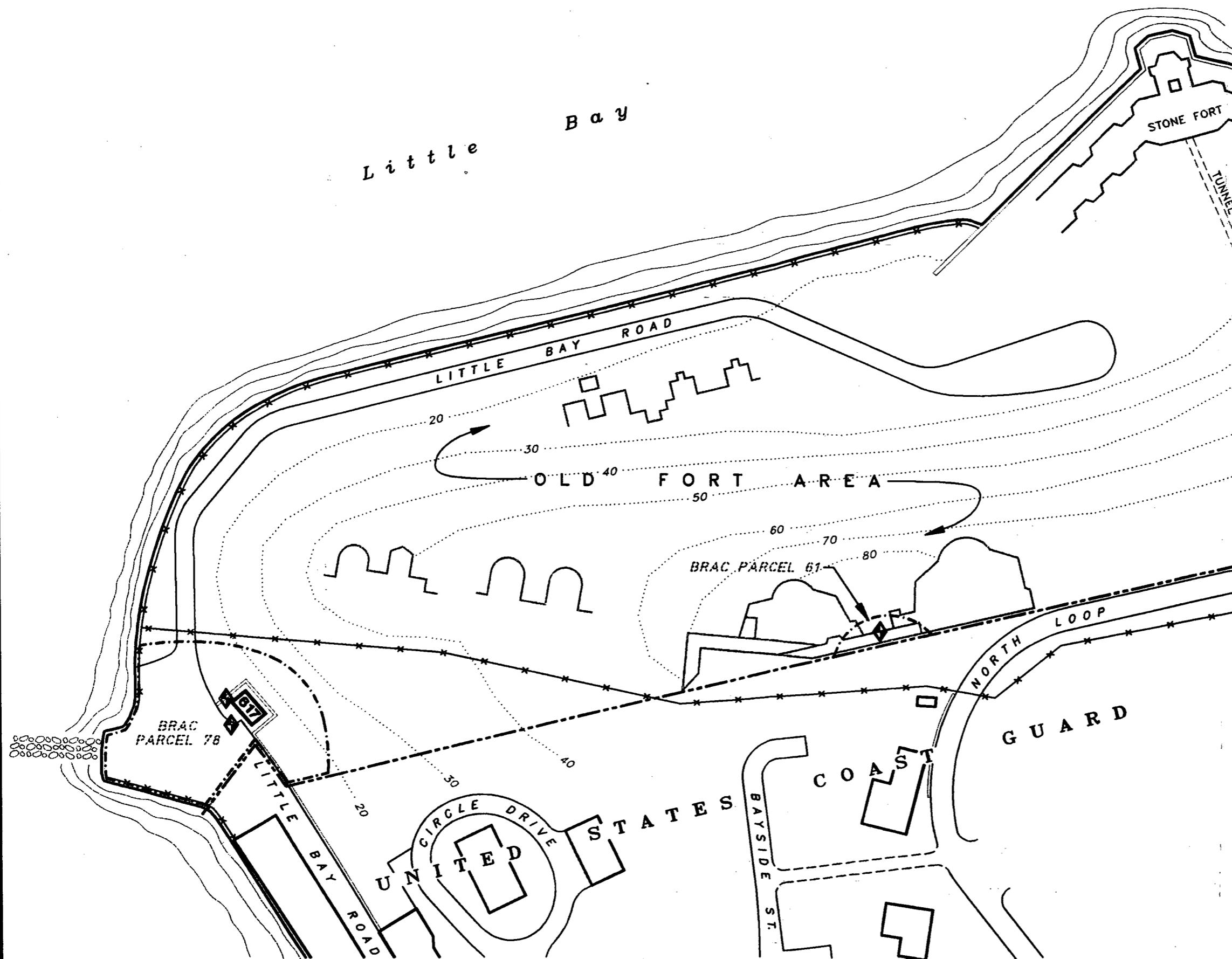
66706

SITE:

FORT TOTTEN  
 BAYSIDE, NY

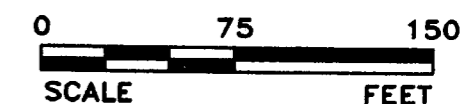
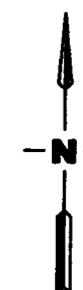
EXHIBIT NO.:

**3-7**



**LEGEND:**

- PROPERTY BOUNDARY
- \*-\*-\* FENCE
- ..... TOPOGRAPHIC CONTOUR
- ◆ PROPOSED GEOPROBE GROUNDWATER AND SOIL SAMPLING LOCATION



U.S. ARMY ENGINEER DISTRICT  
**US Army Corps of Engineers**  
 NEW YORK, NY

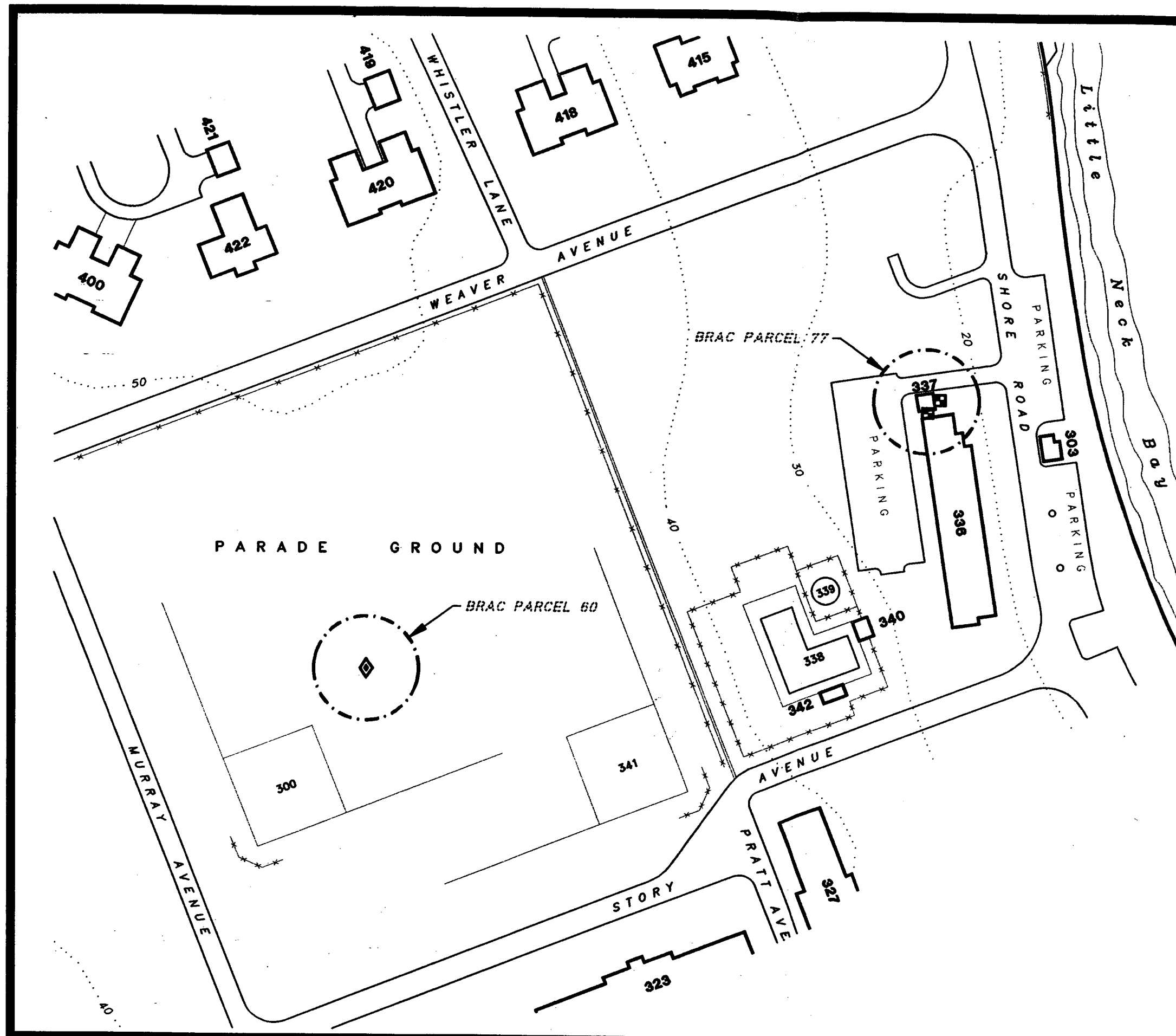
➔ **ICF KAISER** 1301 CONTINENTAL DR.  
 SUITE 101  
 ABINGDON, MD 21009

REVISION NO.: DATE: 07/31/96 ACAD FILE: OLDF-SMP

**PROPOSED SAMPLING LOCATIONS  
 IN THE OLD FORT AREA**

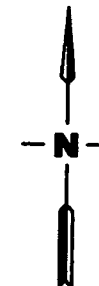
TASK NO.: 66706 SITE: FORT TOTTEN  
 BAYSIDE, NY

EXHIBIT NO.:  
**3-8**





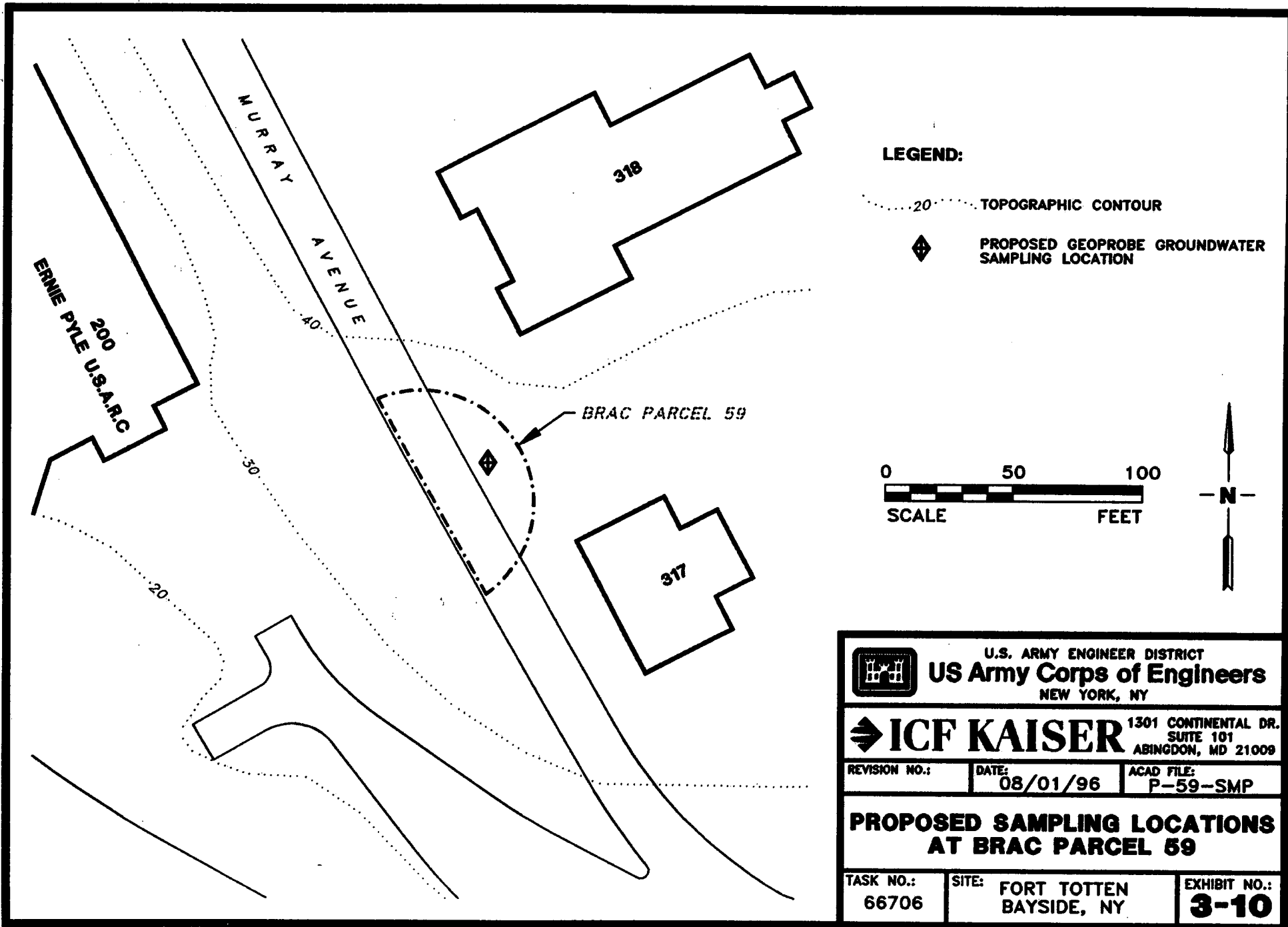
**LEGEND:**

- \*—\*—\*—\*— FENCE
- .....20..... TOPOGRAPHIC CONTOUR
- ◆ PROPOSED GEOPROBE SOIL SAMPLING LOCATION
- PROPOSED SURFACE SOIL SAMPLING LOCATION



0 100 200  
SCALE FEET

 <b>U.S. Army Engineer District</b> <b>US Army Corps of Engineers</b> NEW YORK, NY		
 <b>ICF KAISER</b>		
REVISION NO.: 66706	DATE: 07/31/96	ACAD FILE: PARA-SMP
<b>PROPOSED SAMPLING          LOATIONS AT THE PARADE          GROUND AND BUILDING 337</b>		
TASK NO.: 66706	SITE: FORT TOTTEN BAYSIDE, NY	EXHIBIT NO.: <b>3-9</b>






**LEGEND:**

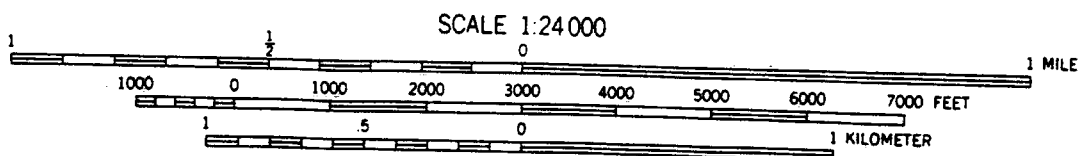
- PROPERTY BOUNDARY
- FENCE
- TOPOGRAPHIC CONTOUR
- FORMER BUILDING LOCATION
- ◆ EXISTING MONITORING WELL
- ◆ PROPOSED MONITORING WELL LOCATION

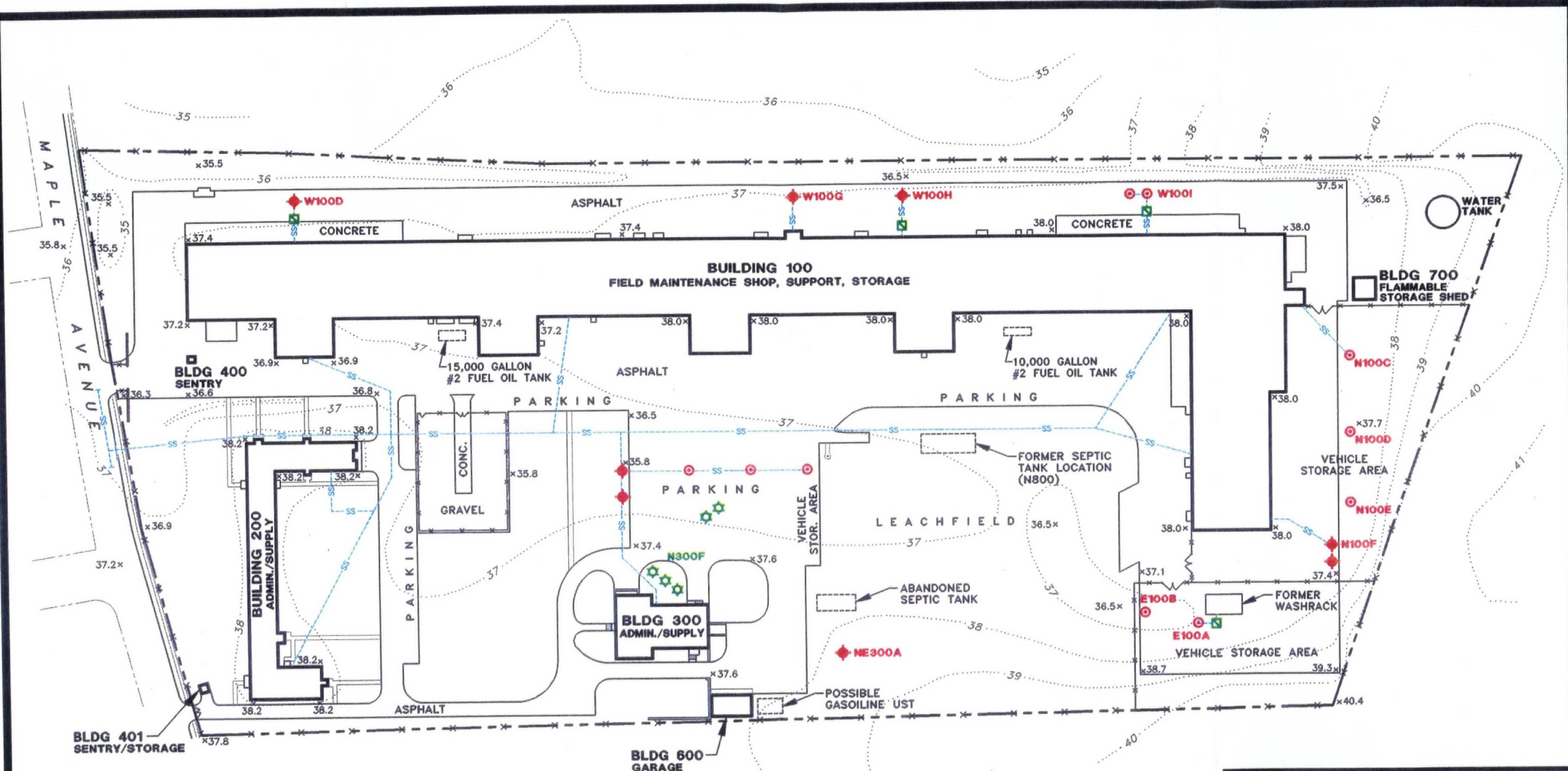


 <b>U.S. Army Engineer District</b> <b>US Army Corps of Engineers</b> NEW YORK, NY		
 <b>ICF KAISER</b>		
1301 CONTINENTAL DR. SUITE 101 ABINGDON, MD 21009		
REVISION NO.:	DATE:	ACAD FILE:
	08/01/96	F-TOT-MW
<b>PROPOSED MONITORING WELL</b> <b>LOACTIONS AT FORT TOTTEN</b>		
TASK NO.:	SITE:	EXHIBIT NO.:
66706	FORT TOTTEN BAYSIDE, NY	<b>3-11</b>

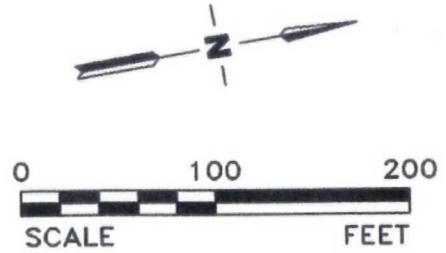
# EXHIBIT 4-1

## VICINITY MAP OF BELLMORE (From USGS 7.5' Minute, Freeport Quadrangle)





- LEGEND:**
- CESSPOOL
  - OIL/WATER SEPARATOR
  - DRYWELL WITH SOLID COVER
  - DRYWELL WITH GRATES
  - x 37.5 SPOT GRADE ELEVATION
  - ..... TOPOGRAPHIC CONTOUR LINE
  - - - - - PROPERTY BOUNDARY
  - x - x - FENCE
  - SS - SANITARY SEWER LINE



U.S. ARMY ENGINEER DISTRICT <b>US Army Corps of Engineers</b> NEW YORK, NY		
<b>ICF KAISER</b> 1301 CONTINENTAL DR. SUITE 101 ABINGDON, MD 21009		
REVISION NO.:	DATE: 08/01/96	ACAD FILE: BELLMSTE
<b>SITE PLAN</b>		
TASK NO.: 66706	SITE: BELLMORE USARC BELLMORE, NY	EXHIBIT NO.: <b>4-2</b>

**EXHIBIT 4-3**  
**SOIL/PAINT AND WASTE CHARACTERIZATION SAMPLING PROGRAM**  
**BELLMORE ARMY RESERVE MAINTENANCE FACILITY**

General Location of Samples	Proposed Number of Sample Locations	Proposed Sampling Depths (ft)	Drilling Method	Number of Samples for Chemical Analyses	Analyses
<b>Soil</b>					
Dry Wells	7	beneath dry well	Hand Auger	7	TCL VOCs, SVOCs, pesticides/PCBs, TAL inorganics + cyanide
Oil/Water Separators	4	at the base of excavation	Hand Auger	4 (1 per oil/water separator) Note: Samples will only be collected if contamination is evident based on PID Screening	TCL VOCs, SVOCs, pesticides/PCBs, TAL inorganics + cyanide
Possible stockpiled soil from Dry Well and Oil/Water Separator Excavations	2 composite samples from stockpiled soil	from stockpiled soil	Hand Trowel	2 These samples will only be collected if there is evidence of contamination (i.e, PID, odor, visual)	Full TCLP (Quick Turnaround)
Contents of Oil/Water Separators (Waste Characterization)	4	liquid and sludge contained in oil/water separator vaults	NA	4 (sludge/liquid)	Full TCLP (Quick Turnaround)
Washrack	6	at the base of the excavation	Hand Auger	6 Note: Samples will only be collected if contamination is evident based on PID Screening	TCL VOCs, SVOCs, pesticides/PCBs, TAL inorganics + cyanide
Possible stockpiled soil from washrack Excavation	1 composite samples from stockpiled soil	from stockpiled soil	Hand Trowel	1 This samples will only be collected if there is evidence of contamination (i.e, PID, odor, visual)	Full TCLP (Quick Turnaround)
Fuel Oil USTs	8	12-14 water table	Hollow Stem Auger	16	USEPA 8021, 8270
Unconfirmed Gasoline UST	1	At the water table	Hollow Stem Auger	1	USEPA 8021

**EXHIBIT 4-3 (Continued)**  
**SOIL/PAINT CHIP AND WASTE CHARACTERIZATION SAMPLING PROGRAM**  
**BELLMORE ARMY RESERVE MAINTENANCE FACILITY**

General Location of Samples	Proposed Number of Sample Locations	Proposed Sampling Depths (ft)	Drilling Method	Number of Samples for Chemical Analyses	Analyses
<b>Soil</b>					
Confirmed Gasoline UST	5	From excavation	Hand Auger	5	USEPA 8021
	3 composite samples from stockpiled soil	From stockpiled soil	Hand Trowel	3 (composite)	USEPA 8021
Building 700 (storage shed)	10	1-2	Hand Auger	10	Total Pb from beneath excavated area
	1 composite	NA	Hand Trowel	1 composite	TCLP (Pb) from stockpiled soil
Drainage Ditch	10	0.5-1.5	Hand Auger	10	TCL VOCs, SVOCs, pesticides/PCBs, TAL inorganics + cyanide
Former Leachfield	4	0-1 5-7 10-12 15-17	Hollow Stem Auger	4 ( One composite from each boring)	TCL VOCs, SVOCs, pesticides/PCBs, TAL inorganics + cyanide
<b>Paint Chip</b>					
Interior and exterior surfaces of Buildings 100, 200 and 300	30-40	NA	NA	30-40	Total Pb

**Legend:**

TCLP: Toxicity Characteristic Leaching Procedure  
TAL inorganics: USEPA Target Analyte List for inorganics  
PCBs: polychlorinated biphenols

TCL VOCs:  
TCL SVOCs:

USEPA Target Compound List of volatile organic compounds  
USEPA Target Compound List of semi-volatile organic compounds

# EXHIBIT 4-4

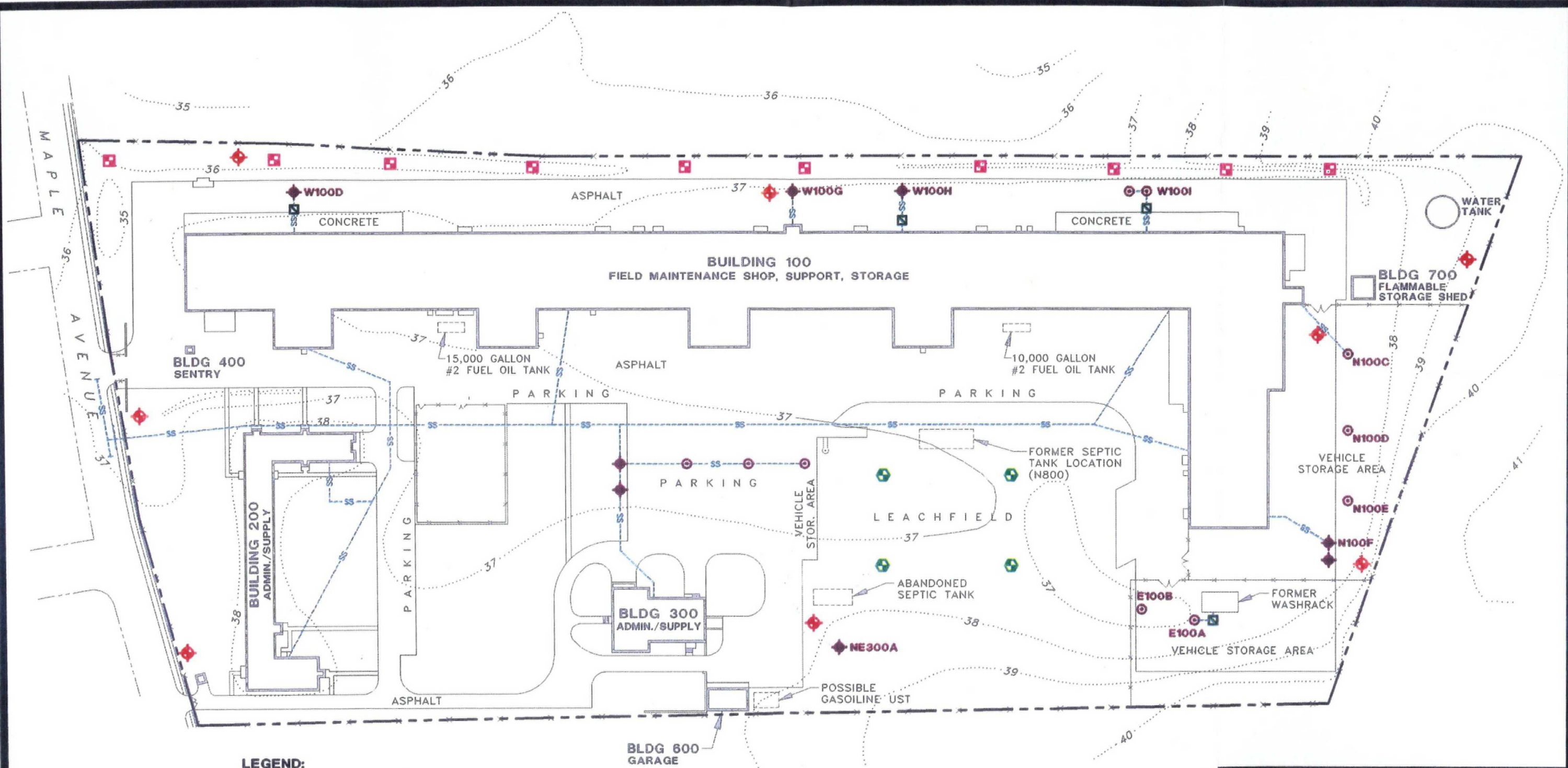
## GROUNDWATER SAMPLING PROGRAM AT BELLMORE ARMY RESERVE MAINTENANCE FACILITY

Monitoring Well Location	Number of Wells	Approximate Depth of Well (ft)	Screened Interval (ft)	Approximate Depth to Water Table (ft)	Proposed Drilling Method	Analysis for Groundwater Samples
Northern Perimeter Boundary (upgradient)	2	25	15 (spanning the water table)	12-18	Hollow Stem Auger	TCL VOCs, SVOCs, pesticides/PCBs, TAL inorganics + cyanide
Southern Perimeter Boundary	3	25	15 (spanning the water table)	12-18	Hollow Stem Auger	TCL VOCs, SVOCs, pesticides/PCBs, TAL inorganics + cyanide
Downgradient of Building 700/Dry Well N100C	1	25	15 (spanning the water table)	12-18	Hollow Stem Auger	TCL VOCs, SVOCs, pesticides/PCBs, TAL inorganics + cyanide
Leachfield	1	25	15 (spanning the water table)	12-18	Hollow Stem Auger	TCL VOCs, SVOCs, pesticides/PCBs, TAL inorganics + cyanide
Downgradient of Dry Well W100G	1	25	15 (spanning the water table)	12-18	Hollow Stem Auger	TCL VOCs, SVOCs, pesticides/PCBs, TAL inorganics + cyanide

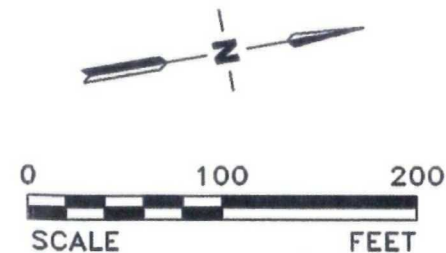
### Legend:

TAL inorganics: USEPA Target Analyte List for inorganics  
 TCL VOCs: USEPA Target Compound List of volatile organic compounds  
 TCL SVOCs: USEPA Target Compound List of semi-volatile organic compounds  
 PCBs: polychlorinated biphenols

NOTE: A total of six groundwater sampling rounds (every 3 months) will be conducted on the proposed monitoring wells. The proposed analytical suite may be revised following review of the second round of sampling results.



- LEGEND:**
- OIL/WATER SEPARATOR
  - DRYWELL WITH SOLID COVER
  - DRYWELL WITH GRATES
  - TOPOGRAPHIC CONTOUR LINE
  - PROPERTY BOUNDARY
  - FENCE
  - SANITARY SEWER LINE
  - PROPOSED SURFACE SOIL SAMPLING LOCATION
  - PROPOSED SOIL BORING LOCATION
  - PROPOSED GROUNDWATER MONITORING WELL LOCATION



U.S. ARMY ENGINEER DISTRICT <b>US Army Corps of Engineers</b> NEW YORK, NY		
<b>ICF KAISER</b> 1301 CONTINENTAL DR. SUITE 101 ABINGDON, MD 21009		
REVISION NO.:	DATE: 08/01/96	ACAD FILE: BELLMSMP
<b>PROPOSED SAMPLING LOCATIONS</b>		
TASK NO.: 66706	SITE: BELLMORE USARC BELLMORE, NY	EXHIBIT NO.: <b>4-5</b>

**EXHIBIT 6-1**  
**SUMMARY OF CHEMICAL ANALYTICAL METHODS**

PARAMETER/ANALYSIS	MATRIX	METHOD
TCL VOCs	soil	USEPA OLM03.0/OLMO4.0
	aqueous	USEPA OLMO3.0/OLMO4.0
TCL SVOCs	soil	USEPA OLMO3.0/OLMO4.0
	aqueous	USEPA OLMO3.0/OLMO4.0
TCL Pesticides/PCBs	soil	USEPA OLMO3.0/OLMO4.0
	aqueous	USEPA OLMO3.0/OLMO4.0
TAL Metals	soil	USEPA ILM03.0/ILMO4.0
	aqueous	USEPA ILM03.0/ILMO4.0
TAL Cyanide	soil	USEPA ILM03.0/ILMO4.0
	aqueous	USEPA ILM03.0/ILMO4.0
Mercury	soil	USEPA SW-846 M7471
SVOCs	soil	USEPA SW-846 M8270
Halogenated VOCs	soil	USEPA SW-846 M8021
Lead	soil	USEPA SW-846 M7421
	paint	USEPA SW-846 M7421
TCLP (Pb)	soil	USEPA SW-846 M7421
TCLP (full) VOCs SVOCs pesticides herbicides <sup>1</sup> metals <sup>2</sup> mercury	aqueous/soil	USEPA SW-846 M1311 USEPA SW-846 M8240/8260 USEPA SW-846 M8270 USEPA SW-846 M8080 USEPA SW-846 M8150 USEPA SW-846 M6010/6020 USEPA SW-846 M7470

**LEGEND:**

1- 2,4-D; 2,4,5 T; 2,4,5 TP (silvex)

2- arsenic, barium, cadmium, chromium, lead, nickel, chromium

**EXHIBIT 7-1**  
**DELIVERY ORDER SCHEDULE**

TASK ORDER No. 6																														
ID	Task Name	Duration	Start	July					August					September				October					November				December			
				30	7	14	21	28	4	11	18	25	1	8	15	22	29	6	13	20	27	3	10	17	24	1	8	15	22	
1	Plans/Approval	45d	7/1/96																											
2	New York Totten	25d	9/2/96																											
3	UXO Survey	7d	9/2/96																											
4	Geoprobe	10d	9/9/96																											
5	Drilling	15d	9/9/96																											
6	Sampling	20d	9/9/96																											
7	New York Bellmore	25d	9/16/96																											
8	Removals	25d	9/16/96																											
9	Drilling	16d	9/16/96																											
10	Lead Paint Survey	7d	9/16/96																											
11	/Lead paint abat/soil rem	16d	9/16/96																											
12	New Jersey Kilmer	15d	9/30/96																											
13	Removals	15d	9/30/96																											
14	PCB Survey	10d	9/30/96																											
15	Pedricktown	65d	9/27/96																											
16	Removals	64d	9/30/96																											
17	PCB Survey	14d	9/27/96																											

CAR NUMBER:

PRIORITY: ☐ HIGH ☐ NORMAL

ISSUED:

CLOSED:

## TYPE I CORRECTIVE ACTION REQUEST

### PART A: NOTICE OF DEFICIENCY. COMPLETED BY INDIVIDUAL ISSUING CAR.

PROJECT:	
PROJECT MANAGER:	CQC SYSTEM MANAGER:
WORK UNIT:	WORK UNIT MANAGER:
ISSUED TO (INDIVIDUAL & ORGANIZATION):	
REQUIREMENT & REFERENCE:	
PROBLEM DESCRIPTION & LOCATION:	
AFFECTED STRUCTURES & ACTIVITIES:	
ISSUED BY (PRINTED NAME & TITLE): SIGNATURE: _____ DATE: _____	MANAGEMENT CONCURRENCE:

### PART B: CORRECTIVE ACTION. COMPLETED BY INDIVIDUAL RESPONSIBLE FOR CORRECTIVE ACTIONS.

CORRECTIVE ACTIONS TAKEN & RESULTS:	
NOTE: SUPPORTING DOCUMENTATION MUST BE LISTED ON THE BACK OF THIS FORM AND ATTACHED.	
PART B COMPLETED BY (PRINTED NAME & TITLE): SIGNATURE: _____ DATE: _____	MANAGEMENT CONCURRENCE:

### PART C: CORRECTIVE ACTION VERIFICATION. COMPLETED BY CQC SYSTEM MANAGER OR DESIGNEE.

CAR DISPOSITION: (CHECK ONLY ONE & EXPLAIN WHERE NEEDED) <input type="checkbox"/> APPROVED FOR CLOSURE WITHOUT STIPULATIONS <input type="checkbox"/> APPROVED FOR CLOSURE WITH STIPULATIONS: <input type="checkbox"/> FURTHER ACTION SPECIFIED IN TYPE II CAR NO:	
AUTHORIZED BY (PRINTED NAME & TITLE): SIGNATURE: _____ DATE: _____	



**8. Off-site Surveillance Activities, Including Action Taken:**

---

---

---

---

**9. Job Safety: (List items checked, results, instructions and corrective actions taken).**

---

---

---

---

**10. Remarks: (Instructions received or given. Conflict(s) in Plans and/or specifications. Delays encountered).**

---

---

---

---

**11. List of Attachments: (List all attachments to this report, include date and reference number where applicable. Attachments are to include copies of inspection checklists, test reports, data reports, and field measurement/calculation sheets.)**

---

---

---

---

**Contractor's Verification:** On behalf of ICF Kaiser, I certify this report is complete and correct, and all materials and equipment used and work performed during this reporting period are in compliance with the contract plans and specifications, to the best of my knowledge, except as may be noted above.

---

**CQC System Manager**

---

**Date**

# ⇒ ICF KAISER

No.

**CORP-QA-0005B**  
**Revision: 1**  
**Effective: 31 Oct 95**  
**Page 14 of 42**

**CG20404**